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NOAA Series on U.S. Caribbean Fishing Communities

Entangled Communities: Socioeconomic Profiles of Fishers, their Communities and their Responses to Marine Protective Measures in Puerto Rico (Volume 2: Regional Profiles)

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Regional Profiles

We have ordered the regional profiles in this section with an eye toward describing the variety we find within Puerto Rico's fisheries as well as prioritizing the profiles, loosely, on the basis of dependence. For example, both the landings data and the dependency scores presented in table IV.2 place locations in Cabo Rojo and Lajas at the top of the lists regarding total landings and extent of dependence. Thus we begin the regional profiles with the Southwest Region that includes these two municipalities. From there, however, we move to the northeastern region because they too rank high in terms of landings and dependency scores, because they represent fisheries that have witnessed growing integration between commercial fishing and tourism (Fajardo), and because they include the two island municipalities of Vieques and Culebra. In the order below, we follow the northeastern profile with the remaining eleven regions, each of which is somewhat distinctive:

- Western Metro Region: Mayagüez, Añasco, Rincón: Another productive region, including the large science and education center of Mayagüez and the innovative fishers of Rincón, the Western Metro region represents fisheries that have been heavily influenced by their proximity to marine science and the University of Puerto Rico Sea Grant College Program.
- Northwest Region: Aguada and Aguadilla: This region includes one of the most well organized and powerful *Villas Pesqueras* in Puerto Rico, and is home to an artisanal boat building operation that supplies vessels to many west coast and north coast fishers.
- Southern Metro: Ponce and Juana Díaz: This region includes Ponce, where its La Playa Association has maintained and chronicled its history and identity in monuments along its shore and the Association at La Guancha has been innovative in taking advantage of the voluminous tourist trade that visits the neighboring beaches and park every weekend.
- Eastern Region: Naguabo, Humacao, Yabucoa, Maunabo: Stretching from Naguabo to Maunabo, this region includes important place-based fishing communities as well as the somewhat distinctive association that has managed to remain in business and even capitalize on the vast coastal gentrification taking place at Humacao's *Palmas Del Mar.*
- Southern Rural Region I: Guayama: Home to one of the most important place-based fishing communities in Puerto Rico, Pozuelo, this municipality-region is the heart of the islands' trap fisheries.
- Southern Rural Region II: Guanica, Guaynilla, Peñuelas: Incipient tourism alongside productive fisheries have defined this region since Griffith, et al. (1988) studied it in the late 1980s. It is also the site of Ricardo Pérez's 2000 dissertation and recent book (2005).
- Northern Metro: San Juan, Toa Baja, Cataño: This region includes the *Villas Pesqueras* of the capital, staying afloat among the cruise and commercial shipping of the busy port of San Juan.
- Southern Rural Region III: Salinas and Santa Isabel: This heavily rural region was once home to some of the most dominating sugar mills of Puerto Rico.
- Southern Rural Region IV: Arroyo and Patillas: Fishers in this region are primarily divers who neighbor regions where trap fishing is important; as such, they are involved in the age-old dispute between these two gear types.
- Northern Muncipalites I: Carolina, Loíza, Río Grande, Luquillo: Home to an African-Caribbean Heritage, the fishers of this region are involved in ongoing disputes with large coastal resorts over the health of its rich mangrove forests and wetlands.
- Northern Municipalities II: Isabela to Dorado: Most of the fishing communities and municipalities in this region rank low in terms of both landings and dependency scores.

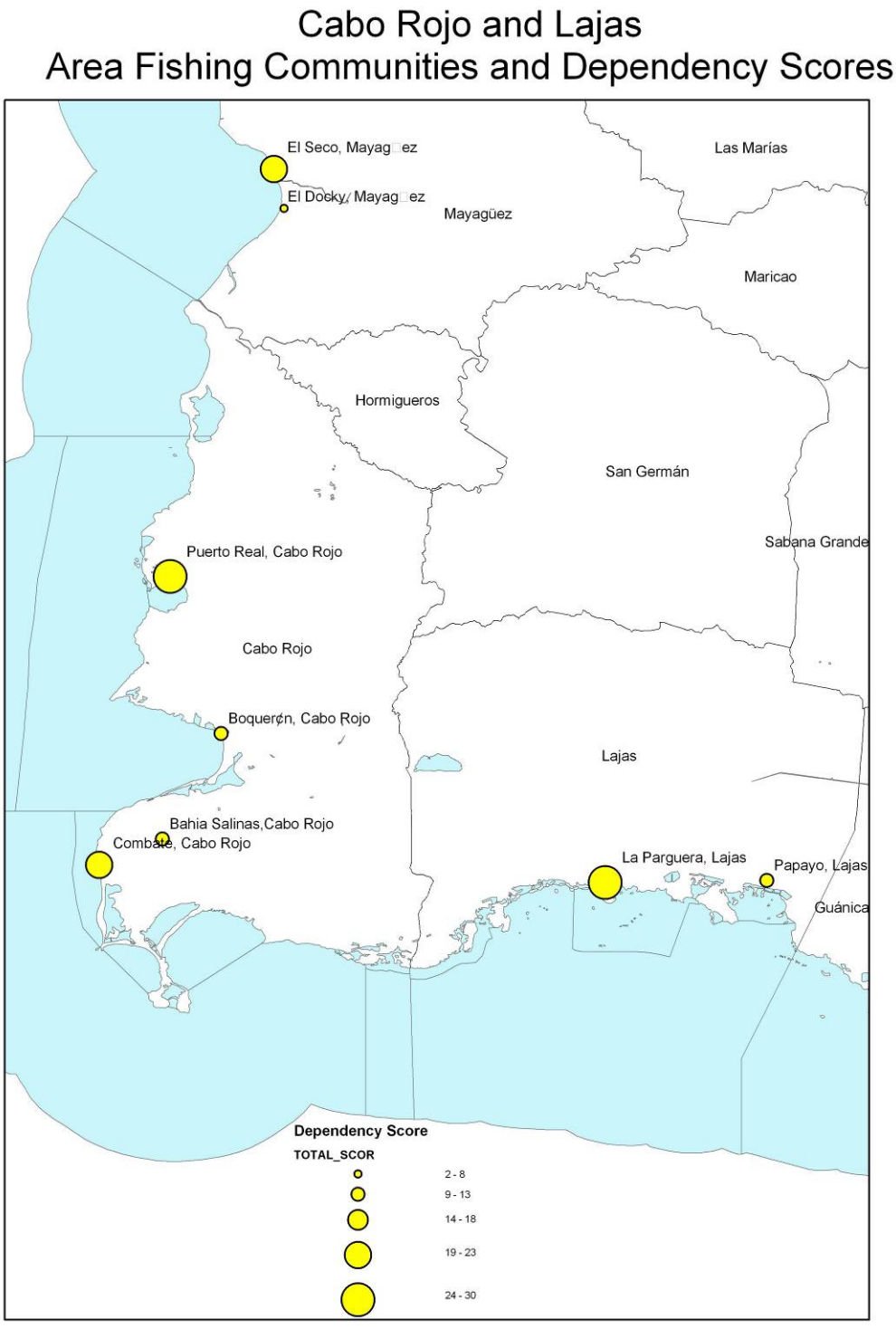
Southwestern Region:

Cabo Rojo and Lajas

There is little doubt that Puerto Rico's southwest coast has been and continues to be home to its most productive commercial fisheries, even in light of distinctive and elaborate developments in other municipalities, such as the increasing integration of commercial fishing and tourism in Ponce or Fajardo or efforts to professionalize fisheries in Rincón. Puerto Real, Cabo Rojo was the site of Valdés Pizzini's doctoral dissertation (1985), which was among the first anthropological studies of fishing in Puerto Rico and which encouraged and set the stage for several other related works on Puerto Rico's coastal communities (e.g. Valdés Pizzini, 1985, 1990; Valdés Pizzini, et al. 1988; Griffith, et al. 1988; Griffith and Valdés Pizzini 2002; Brusi 2004; Pérez 2005; García Quijano, forthcoming). Two other significant sites in Cabo Rojo, Boquerón and Combate, represent alternatives to the fishing styles of Puerto Real.

In addition, La Parguera in Lajas has tranformed, in the words of one its residents, from a fishing village to the capitol of Lajas, emphasizing the importance of this small coastal city in the regional economy. Its *casetas*—or houses built illegally into the mangroves and out over the bay—have been a point of contention among fishers and DRNA personnel at least since the 1980s (Valdés Pizzini 1990), yet collectively constitute one of the region's largest marinas and are occupied by professionals from as far away as San Juan. It has been the site of increasing gentrification, some of which has been spearheaded by long-term residents who have taken over public lands (Brusi 2003), and every weekend it attracts throngs of visitors from all over Puerto Rico. Finally, one of the largest of Puerto Rico's MPAs extends from the southern coast of Lajas.

Map SW.1. Southwest Fishing Communities



Cabo Rojo

Arguably the municipality in Puerto Rico most dependent on fishing, with the highest annual landings and the most productive fishers, Cabo Rojo has seven landing centers and at least as many significant sites where fishers congregate: four to five in Puerto Real, two in Boquerón, and one in Combate. The site of Valdés Pizzini's doctoral dissertation (1985), Puerto Real has long been the home port of deep water grouper-snapper fishers who fish the Mona Passage, as well as divers, many of whom sell to private fish buyers rather than to fishing associations.

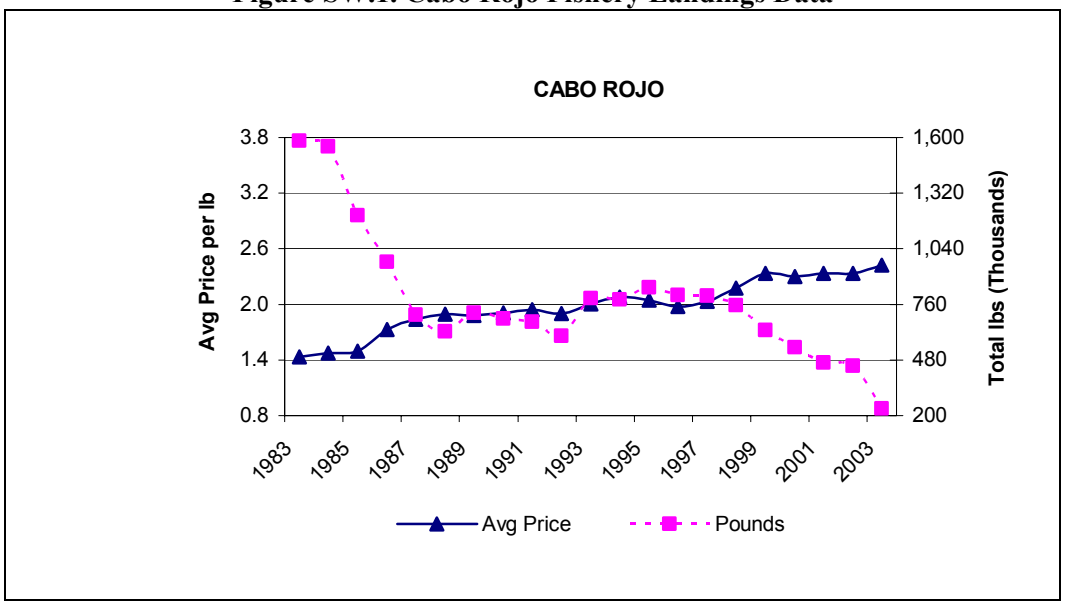
Table SW.1. Cabo Rojo Demographic Information

CABO ROJO	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	29,546	24,868	26,060	34,045	38,521	46,911
Civilian Labor Force (CLF) [2]	9,311	6,220	7,395	10,040	13,483	15,701
CLF - Employed	9,174	5,948	7,041	8,934	10,501	12,801
CLF - Unemployed	137	272	354	1,106	2,982	2,900
Percent of unemployed persons	1.47	4.37	4.79	11.02	22.12	18.47
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		2,516	1,649	690	608	388
Construction		228	624	636	749	1,118
Manufacturing		888	1,580	2,826	2,462	2,221
Retail trade		856	1,135	1,226	1,852	1,896
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	N/A	20.3	24.6
Persons who work in area of residence [6]		4,908	4,630	4,887	5,762	5,957
Per capita Income (dollars) [7]			788	1,856	3,823	8,070
Median Household Income (dollars) [8]		844	1,994	4,478	7,832	13,580
Individuals below poverty level [9]			18,216	22,049	23,711	21,995
Percent of Individuals below poverty level			69.90	64.76	61.55	46.89

Despite its clear fishing community identity, for the past several years, Cabo Rojo's coast has been experiencing gentrification, with plans for major coastal development projects to the south and north of the town of Puerto Real, and already the growth of this nature has caused crowding in Puerto Real and elsewhere, where commercial and recreational boats often occupy slips side by side. Boquerón is somewhat ahead of Puerto Real in this regard, having witnessed massive construction projects for high-priced condominiums and an expansion of its tourist trade. Combate's growth, along with a part of Cabo Rojo across the bay from Puerto Real, has been somewhat distinct, with people using areas near the shore for mobile homes.

The above table shows trends similar to those in the other western municipalities: increased unemployment, declines in persons employed in the extractive industries, fewer individuals below the poverty line, and higher per capita incomes. Cabo Rojo lost about 10% of its manufacturing jobs from 1990 to 2000, while construction employment increased by nearly 50% (in part a function of gentrification) and retail trade increased slightly: again, a mixed economic picture not unlike the other municipalities.

Figure SW.1. Cabo Rojo Fishery Landings Data



Data from Cabo Rojo's landing centers, however, is less ambiguous. Landing over 2.2 million pounds valued at over $5.2 million from 1999 to 2003, fishers in Cabo Rojo ranked first among all municipalities, yet recent landings data suggest that this level of performance may not be sustained in the future. Dropping sharply from 1983 to 1989, landings remained relatively stable through the 1990s, with price reflecting supply (correlation coefficient = -.8705). The catch's value in 1990 was slightly more than $1.3 million, more than twice the 2003 value but only around 25% higher than the catch's value in 2002. In other words, falling catches have resulted in rising ex-vessel values, but 2003 was a particularly poor year.

Fishing remains a cornerstone of the economy of Puerto Real and a significant component of the economies of Boquerón and Combate as well. In each of these communities, seafood consumption is one of the principal draws for tourists, and weekend tourist traffic generates income for large and small businesses in all these areas. Joyuda, north of Puerto Real, is lined with seafood restaurants and beach hotels, and Boquerón is well known for its roadside oyster bars and booths that sell *pinchos* and *empanadillas* made with a variety of marine species of fish and shellfish, including octopus, lobster, trunkfish, and shrimp. Thousands of tourists visit the Cabo Rojo coast every weekend, and consuming local seafood is a significant part of its attraction. Despite this, fishers we interviewed find tourism and gentrification a mixed blessing, with fishers in Boquerón, where the process is furthest advanced, most likely to speak of these developments in negative terms.

Recreational Fishing from Cabo Rojo

In addition, sport fishing from Cabo Rojo has been robust in recent years. Some of the photographs that follow show that, combined with recreational boating, recreational fishing has created some slip space problems in Boquerón and Puerto Real, suggesting, at the same time, that recreational fishing has become more elaborate in Cabo Rojo. Along with its Clubs Nauticos, the municipality has at least two professional charter boat fishing boats, one of which has been in business for over a decade. Due to confidentiality issues, we discussed the charter boat business in more detail in an earlier, separate section, here simply mentioning that it comprises yet another dimension to Cabo Rojo's fishing profile, making it that much more dependent on fishing in all its forms.

Cabo Rojo History

Archaeological evidence suggests that humans have settled in Cabo Rojo since the time of Christ, and the municipality, primarily because of its salt resources at its southern end, was settled by Spaniards as early as 1515. At this time the seat of Puerto Rican government was in San German (east of Cabo Rojo), which dominated the entire southwestern coast and claimed Cabo Rojo's territory as its own until 1771, when Don Nicolás Ramírez de Arellano initiated plans to, and succeeded in, breaking from San German. Shortly thereafter residents began constructing its first Catholic church and a *Casa del Rey* (King's House)—two necessities for official recognition as a *pueblo* during the colonial period. Five years later they had completed both structures along with eleven houses and a handful of shacks, and they had over 1,200 inhabitants and a standing militia. Population growth was rapid thereafter, rising to over 10,000 by the 1820, about 8% of whom were slaves.

Early on Puerto Real became a bustling port, attracting foreigners and, as was common during the 18th and 19th centuries, first piracy and later contraband trade. Valdés Pizzini (1985) suggests that early commercial fishing from Puerto Real consisted of the export of marine turtle shells to San Juan. Through the 19th century the population became more diverse and grew to reach more than 16,000; by 1873 the enslaved population were freed and looked to Dr. Ramón Betances, an ardent abolitionist who achieved a level of heroism during the 1850s cholera epidemic in Cabo Rojo, as their leader. By the time the U.S. forces assumed control of Puerto Rico, in 1898, Cabo Rojo had eight schools.

Toro Sugrañes reports that the Masons were powerful in Cabo Rojo under the Spanish and that they became even more powerful there through the change to U.S. sovereignty, building a Masonic temple in Puerto Real in 1923 that was named after Dr. Betances (*Cuna de Betances*—Cradle of Betances). Shortly after this, fishing in Puerto Real began to take off. In the 1930s, Puerto Real fishers began selling fish up and down the west coast as fish dealers concentrated their efforts in this port city. These dealers, who eventually gained partial control of the fisheries of Puerto Real, established merchant capital ties to fishers, extending them credit and enabling fishing on the condition they sell to them. Eventually, through marriage, *compadrazgo* (ritual co-parenthood), and other cultural ties, dealers' families and fishers' families became intertwined, yet dealers continued to dominate the fisheries, investing in harbor infrastructure such as piers and ramps as well as in freezers. By the 1970s fish dealers organized the fisheries of Puerto Real, although fishing across the rest of Cabo Rojo, from ports like Boquerón and Combate, were smaller and less prone to the control of Puerto Real. Through the exploitation of the substantial grouper and snapper stocks in the Mona Passage, west of Puerto Real, however, Puerto Real fishers became the premier fishers of Puerto Rico in terms of landings and income.

Boquerón

The line of shops, booths, and small restaurants that runs along the waterfront in Boquerón is bordered on the north by Club Nauticó de Boquerón and on the south, across a narrow canal, by the Villa Pesquera of Boquerón. The Villa Pesquera adjoins a public beach and neighbors some of the most expensive real estate in town. Ten fishers fish from this Villa Pesquera, using trammel nets, gill nets, and long lines. They captain between 6 and 7 vessels. In addition to typical facilities (29 lockers, a pier for launching and mooring boats), the Villa also has facilities for repairing boats and, as usual, a *pescaderia.* Most of them fish to the south of Boquerón, off Point Guaniquilla. While none currently fish from Bajo de Sico, Abrir la Sierra, or Banco del Medio, they said that they did fish these areas previously, indicating they were negatively affected by the closures. Those we interviewed were not forthcoming regarding the times of year or the extent to which they fish these areas.

Figure SW.2. New Coastal Development in Boquerón

As in other places experiencing gentrification, Boquerón's growth, according to local fishers, has turned young people against fishing. Jobs in construction are plentiful in the area, with the construction of new high-rise condominiums, and construction is a typical area that absorbs fishers when they need additional income. The fishers of the association claim that they sell their fish in Cabo Rojo (the capital city) rather than to local restaurants, because, they believe, locals are "working to eliminate the small scale fisherman in order to attract [other] businesses." Instead of buying from local fishers, the restaurants bring in frozen fish. Even "for Lent," one fisher said, "it all comes from outside."

Among the problems that Boquerón fishers noted was the failure of the local fishing community, which is already small, to reproduce itself. According to one we interviewed, the young people in the area don't want to fish commercially, but instead want to catch fish as a game, without realizing that "one cannot play at sea" (that is, one must take fishing seriously).

Figure SW.3. Club Naútico of Boquerón

Playing at sea, of course, is exactly what members of the recreational fishing community of Boquerón are interested in. The above photograph depicts their Club Nautico, which sits in the heart of the busy coastal road of downtown Boquerón, nestled among the weekend oyster and pincho stands and a SCUBA diving school. Nearby are businesses that rent kayaks and other watercrafts and offer boat rides. The few recreational fishers we interviewed in Cabo Rojo were more or less split between SCUBA divers and hook-and-line fishers, with one of the former a captain of a dive boat and one of the latter fishing primarily for food. This reflects the range of recreational fishing in a place like Boquerón, where one is liable to encounter recreational fishers from all social classes and fishing from boats, piers, bridges, and the shore. These different fishing styles produce different results, and species that recreational fishers from Cabo Rojo reported landing include near-shore fish and shellfish like snook and conch as well as deep water snapper and grouper species.

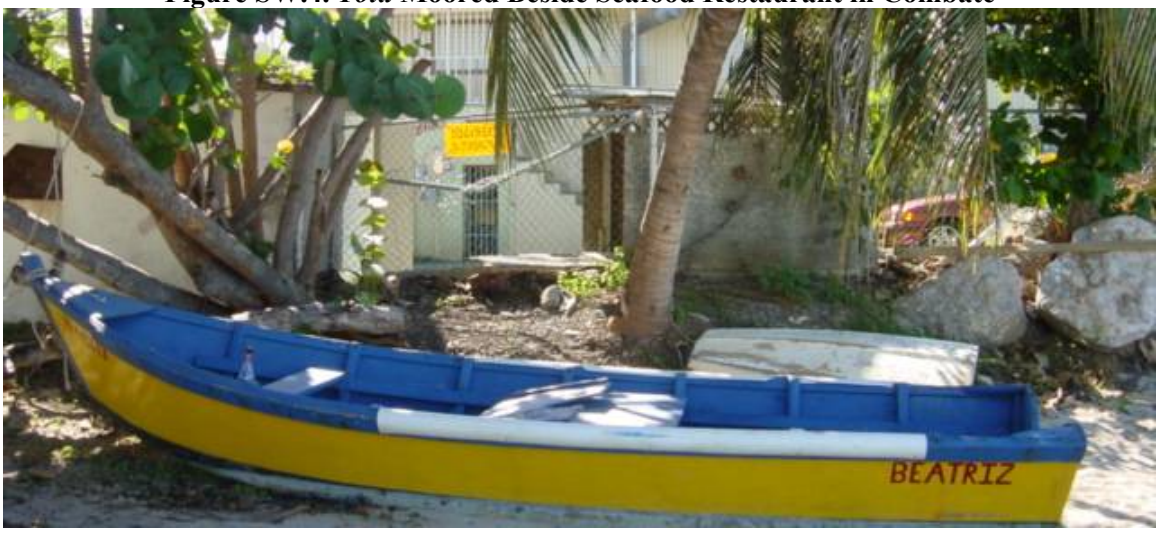
Combate & Bahia Salinas

The isolation of Combate (as well as Bahia Salinas, to the south) may factor into their dependence on fisheries, in that both of these places sit at the ends of dead-end roads, quite off the beaten track. Bahia Salinas consists of little more than a rutted road with a small hotel, a salt mining operation, and a few families who fish. Combate, however, is a different story. It is a community whose isolation has both costs and benefits. When we asked local fishers about marketing in Combate, one said that there was no competition from other fishers in Cabo Rojo (*"En Combate no hay competencia")*; at times, even, when Puerto Real fish buyers are having trouble keeping up with demand, they get fish from Combate. Yet its isolation may contribute to the perceived marginalization of its association and its utter lack of government assistance.

Combate has several seafood restaurants (5, at least) in the downtown area, and is also home to a phenomenon that is somewhat rare in Puerto Rico: mobile homes. There are hundreds of small mobile homes, slightly larger than campers but not quite as large as the single- and double-wides one sees across the rural South. These kinds of dwellings suggest that the community is home to many seasonal residents who, no doubt, enjoy local seafood when they're staying in town. Again, this is a town whose population and demand for marine resources fluctuates through the week.

There is an active fishing association in Combate, near the downtown, that is currently repairing a large pier in front of it facilities. Adjoining the association is a small beach with cabanas and other infrastructure, a place active on weekends. Although the association's facilities are less elaborate and older than those at Aguadilla, they nevertheless seem fairly complete: with 20 storage lockers, a *pescaderia*, at least two cleaning facilities, and a shaded area where the fishermen gather and talk when they aren't fishing. According to the president of the association, 24 fishers belong to this association, yet its viability as a functioning association was in question at the time we visited. Although you must be a resident of Combate to have a locker at the association, fishers who belong need not sell to the association. Instead, its main usefulness is that it is a place where fishers can repair vessels. The association could use two more vessels to be able to fish more effectively with beach seines (for bait) and gill nets.

Figure SW.4. *Yola* Moored Beside Seafood Restaurant in Combate



Currently, fishers from Combate use a combination of hook-and-line rigs, trammel nets, and diving. There are distinctions between the divers and those who use the other gears. The divers catch conch and lobster, which they sell to restaurants in Combate and outside of the community instead of to the association, and they also buy most of their equipment from outside the community.

The others fish primarily for parrotfish, snappers, groupers, and dorado, which they sell locally and to two or three buses that come to the association periodically from neighboring municipalities. One from Guayanilla (about thirty miles due east from Combate) buys around 100 pounds of fish from them each time it comes. They also sell to eight to ten local *colmados* (small grocery stores) and supermarkets, including Mr. Special and Pitusa (two large chains). Typically they fish six to seven miles off shore, or close to Abrir la Sierra and Boya 8. While fishing these areas, they often catch fish that they cannot sell and for which they may be fined. They mentioned several species, barracuda, *jurel,* and *madrigal,* that are candidates for ciguatera poisoning and hence off limits. With long-lines (*la cala*), they often accidentally catch sharks that they have to throw back. More troubling to thoughtful fishers, however, is that when they pull snapper and grouper from deep water (over 20 fathoms), the fish die from lack of pressure but the fishers have to throw them back or else they will be fined. These observations provide additional argument for incorporating fishers' environmental knowledge into the regulatory process.

One of the underlying reasons for the association's lack of viability is that it has received little to no help from the government through the years. The small shed where they process the fish needs between $10,000 and $12,000 in repairs. They can't afford these repairs in part because of recent licensing requirements, which have placed additional costs on fishing, with separate licenses required for some species. The president viewed himself and the others of the association as poor and powerless, and he believes that government funding has been unevenly distributed over fishing associations around the island. "All of the fishing programs," he said, "stay in Ceiba and Fajardo" (both on the Eastern side of the Island and common recreational destinations for people from San Juan). Other than these programs, the government has, according to Combate fishers, cut benefits for most fishers and fishing communities. One said, "We are 2,000 fishermen [in Puerto Rico] and we can neither knock the government down or raise it up," reiterating the powerlessness this fisher perceives. We emphasize that these are fishers' *perceptions*, which may not be 100% accurate yet do reflect the reality of fishing folk in Puerto Rico. As such, fisheries managers need to pay close attention to them, initiating educational programs if they find them at odds with their perceptions of reality.

Puerto Real

Few would dispute the notion that Puerto Real is, if not the most, one of the most fishing dependent communities in Puerto Rico. Since Valdés Pizzini wrote his doctoral dissertation in the mid-1980s, the community has changed in significant ways while still managing to maintain a heart of commercial fishing. Our interviews in Puerto Real elicited mixed reactions concerning the ways the community has been changing, particularly regarding the proposed developments to the north and south of town, with some viewing these as adding to current problems of adequate space for boats and others seeing them as potential benefits to fishers in particular and the community at large: *"Si viniera una nueva marina vecinos de nosotros pues sería positivo porque viene más turismo y más ingreso."* ["If a new marina becomes our neighbor, well, it would be positive because it brings more tourism and more income."]

Figure SW.5. Chapel of the Virgen Del Carmen, Puerto Real

La Villa

La Villa is an association with 20 firm members who sell to its market, and others who sell to the association but are not considered members. Its facilities include a small bar, which they rent to a private individual, and other typical association facilities. The majority of the members (12 of the 20) are bottom-fish line fishers, who fish primarily for snappers and groupers for sale principally to local restaurants; one of these fishes the Mona passage with a large vessel outfitted with a winch and the others fish from smaller vessels with hand lines (*cordel)*. Six divers and two trap fishers make up the remaining members. It may be somewhat unique to have fishers fishing these two gears in the same association, given the fact that trap fishers often accuse divers of stealing from their traps, yet diving has assumed a more prominent role in Puerto Rican fishing over the past few years, while trap fishing has declined (Matos 2002). The mix here may reflect this island-wide trend. The divers fish around the bouys off shore, including Boya 6, as well as Tourmaline.

Map SW.2. Puerto Real Bay

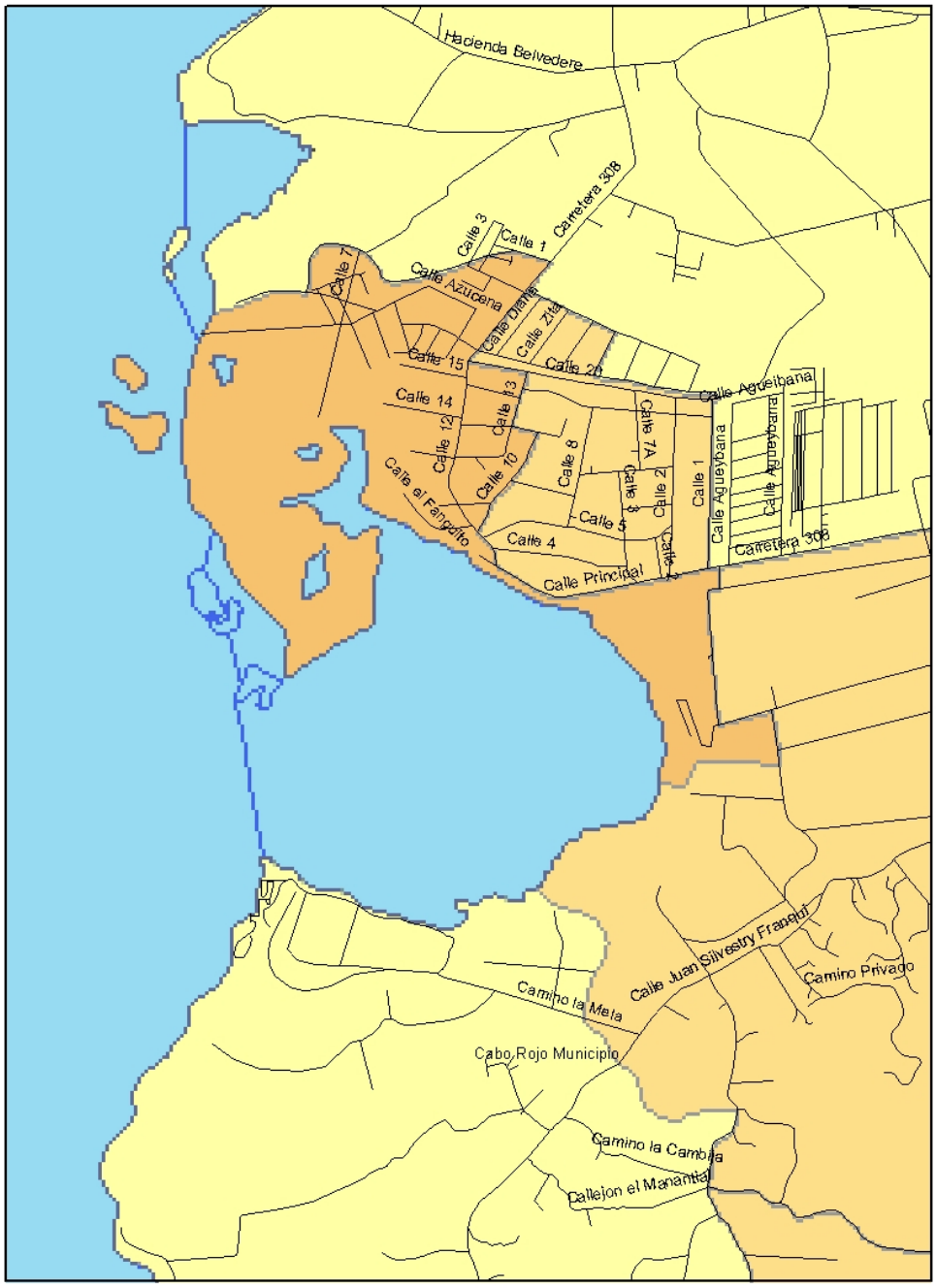


Figure SW.6. Repairing Recreational Vessels at *La Villa*

They sell most of their catch locally, to at least three local restaurants and a seafood company, as well as to the general public from their market, but mentioned that they tend not to sell to hotels. We heard from others the hotels tend to buy cheaper imported fish, though this is not always the case. The fish they don't sell locally they sell throughout Cabo Rojo and into Mayagüez, but they have considerable local competition from at least two other major seafood dealers and others who fish. Many fishers in Cabo Rojo do not belong to fishing associations; Valdés Pizzini found that they tended to be tied to private fish dealers instead, something the census data suggest may still hold true today.

Table SW.2. Marketing Behaviors of Cabo Rojo Fishers (n=103)

Variable	Percent
Private	0.0
Fish Buyer	51.5
Association	8.7
Walking	18.4
Restaurant	18.4
Own Business	3.9
Gutted	65.0
Ice	29.1
None	17.5

This association, like other places where fishers congregate in Puerto Real, has already begun sifting some of the tourist business into their traditional services. They have repair services, including a crane and space to make repairs, and they routinely maintain or repair boat hulls (although not motors). In addition to benefiting from the high demand for local seafood in Puerto Real's restaurants, they derive income from renting the bar to a third party. Most of those we interviewed here believe that growth will lead to more income for them, more opportunities, and they haven't experienced some of the problems other fishers have experienced, or at least not to a great degree, such as the growth of jet skiing. While one fisher we interviewed here said that they had no problems from jet skis because they fished so far from shore, this same fisher also commented that they used to fish near the shore around Combate but had

to quit this because of jet skis. While they may not have had problems with gentrification yet, one fisher did mention that, "The regulations are driving us crazy!" blaming them for changes in fishing more than changes in the social composition of the coast. [*"El reglamento nos tiene locos. La pesca en los últimos diez años ha cambiado por las diferentes nuevas reglas."*] They mentioned, specifically, the problems with bringing up undersized fish from great depths, killing them in the process, along with the cost of licenses, the perceived bias of government programs toward east coast fisheries, and the lack of restrictions on imported fish.

Regulators are as common a source of frustration as regulations. Another fisher interviewed at La Villa mentioned that they were attempting to acquire funds for a ramp and a new pier, intending the ramp to be available to the general public. He said that they perceive the need for these facilities because of a shortage of slip space and because they need to pull their boats from the water during hurricane season. He added that the difficulty of accomplishing this was in part due to the apathy of the community and their indifference toward fishermen. Other fishers who entered this discussion added that there had been problems with the Department of Natural Resources over the question of ramps and other facilities. Again, like fishers across the island, the DRNA staff and practices tend to be viewed in negative terms, in this case not helping them acquire a ramp, fining them for using DRNA ramp, and showing some favoritism to the big developments going in to the north and south of town. When hurricanes destroy fishing infrastructure, including piers but also including some of the locals' *casetas* along the shore, the DRNA often refuses to issue permits to rebuild. They added that, "Houses along the shore are part of the history of a fishing community that is Puerto Real." [*"Las casetas en la orilla son parte de la historia de una comunidad Pesquera que es Puerto Real."*]

As just noted, however, most fishers in Cabo Rojo neither belong to nor sell to associations, and the opinions of those who do belong to associations may not accurately represent all fishers. The following table does show, however, that fishing activity is nonetheless heavy, with just short of one-third of the population fishing 40 hours per week or more and over two-thirds fishing over 20 hours per week. The wide variation in fishing activity, as reflected in the high standard deviation, may be a function of the nature of recent growth in the municipality, with work in construction and other work associated with gentrification taking time away from fishing. At the same time, the conditions off the Cabo Rojo coast and Puerto Real's tradition as a commercial fishing center may be encouraging fishers to keep one foot in fishing even if they are engaging in other activities as well.

Table SW.3. Association Membership and Hours spent Fishing, Cabo Rojo (n=103)

Variable	Response
Percent Affiliated to Association	39.8
Hours engaged in fishing activity	
0 – 20	29.1
21 – 30	25.3
31 – 39	14.5
40	16.5
> 40	14.6
Mean hours	32.36 (sd = 26.763)
Minimum	0
Maximum	192

Cabo Rojo's varied coast line and its varied experiences with gentrification are also reflected in the wide range of fishing gear that are used across the municipality. Similarly, fishers in Cabo Rojo fish a number of different environments, with fishing the continental shelf and the reefs the most widely practiced. The following two tables, which include data from all Cabo Rojo (Boquerón, Combate, Puerto Real, and other areas), present the census data concerning fishing territories and gear.

Table SW.4. Fishing Gear Used in Cabo Rojo (n=103)

Variable	Percent
Beach Seine	3.0
Trammel Net	10.7
Long Line	2.9
Troll Line	3.9
Fish Trap	19.4
Gill Net	14.6
Cast Net	22.3
Hand Line	50.5
Rod and Reel	10.7
Lobster trap	1.0
Snapper Reel	5.8
Winch	9.8
Spear	41.7
Lace	37.9
SCUBA	29.1
Gaff	27.2
Basket	1.0

Table SW.5. Fishing Territories of Cabo Rojo Fishers (n=103)

Variable	Percent
Shore	9.7
Continental Shelf	81.6
Shelf Edge	11.7
Oceanic	8.7
Reef Fishes	86.4
SCUBA Diving	5.8
Skin Diving	3.9
Pelagic	2.9
Bait	15.5
Deep Water Snappers	7.8

Figure SW.7. Map of Proposed Development in Cabo Rojo (colored section; Puerto Real is above)

Pesquedería Fortuña [1]

This private fish market relies on eight to ten fishers to supply it with fish regularly. It is a family business, run primarily by Fortuña and his wife, with the help of their granddaughter. During Lent, which was the time we visited, they were specializing in grouper, but they have a good deal of fish on hand and this year have been catching more lobster. Fortuña said that those who fish for him fish in a variety of locations, none of which include areas that are restricted due to seasonal closures or, more recently, Marine Protected Areas.

He fishes with traps daily, every day but Sunday, but he is careful not to set his traps on coral reefs, because he perceives that this damages them, despite that many of the lobster live around coral reefs. Instead he sets them in places he knows that the lobster will eventually venture. He has one boat dedicated to snapper fishing, catching as much as 170 pounds per trip by attaching lines to buoys and fishing 30 hook at a time. Still, he spends most of his time with his traps. To protect them from theft, he described a method of triangulating them from Boya 4.

From his fish market he sells to at least four restaurants, which were none of the same restaurants named by the association members, and also has a bus for selling fish along the street. He said that almost no people come to his seafood market to shop: he has to go to them. Unlike some of the other fish dealers in town, he doesn't provide services to tourists, such as selling them fuel or ice.

[1] Unlike the names of the fishing associations, which are matters of public record already, we have given this private business a pseudonym, as we have with all of the individual fishers we interviewed.

He claimed that they almost always sell their fish at the same price (a claim the landings data seem to support) and that their fish almost always sells for more than fish sells in other areas. This is primarily a quality issue. He mentioned a fish dealer in a neighboring municipality who sells his fish in a less fresh state, adding that this made the other fish dealer's fish difficult to clean. He also mentioned imports, saying that it was impossible to try to compete with *pescao' Americano* (a reference to imports via U.S. distributors). Instead he said, "I defend myself with lobster," suggesting that the only way he can compete is by specializing in species that are both expensive and only locally available in a fresh state.

Regulations, he claimed, have created a black market for seafood, and many of them make no sense from a biological point of view. He said that any regulation beyond the seasonal closures at the buoys is unjust. The closures there had a reason, especially regarding the protection of grouper, but the problem was that they extend to other species as well. They agreed with the closures for protecting grouper, but not so many other species indiscriminately. Besides, in other areas where there are no restrictions, such as Guánica, they are able to catch grouper, and some fishers, notably divers in his view, still fish in the restricted waters. (It should be noted, however, that as a trap fisherman, Fortuña may be biased against divers because of the widespread belief that divers steal from traps and even steal the traps themselves). He said that people were going to continue fishing, violating the laws, because some of the more influential fish dealers in the area have suggested, like him, that the current regulations are unjust. They have been encouraging, that is, civil disobedience.

Perhaps his most telling statement, however, concerned the landings data. He said that fishers in Puerto Real have been catching fish consistently over the past five years, at relatively the same levels. *"Hay pesca,"* he said: "There are fish. What happened is that they [the fishers] don't report the statistics." In other words, the landings data, on which many of the regulations rest, he believes, are flawed.

Pescadería Montalvo

This fish market organizes a fleet consisting of four fishing vessels and ten fishers, all of whom are primarily divers. Some fish with long lines during some times of the year, at which time they fish around Boyas 4 and 6. When they are diving, they fish around four miles off shore, which puts them close to these areas as well.

Montalvo believes that the demographic and qualitative changes taking place within the fishing community may undermine his ability to stay in business many more years. Every day he sells as much as can, but there are fewer and fewer *good* fishers all the time: many have already died or retired. The DRNA, he believes, is no longer interested in maintaining the fisheries for the support of fishers and their households, but is instead interested, he said, primarily in reforestation. During another part of the interview, however, he said that most of the fishers were young, which is consistent with diving.

He sells primarily to restaurants in the area, listing seven of them by name, none of which were listed by fishers at either of the other two marketing centers discussed above. This may suggest that restaurant owners come to rely on specific fishers for their supplies, developing ties of loyalty. Montalvo said that he sells to only one *guagüero* (person who sells fish from a *guagua*, or bus) who buys his first class fish, avoiding the others because they only buy second class fish. His most popular selling species are conch, lobster, and grouper.

Montalvo mentioned a number of other suppliers of services and materials in Puerto Real, including some of his competitors, listing those that sold, filled, and serviced tanks and those that sold ice, adding that some of the divers have complained about the quality of the tanks and the quantity of the air they receive from the supplier. At times, too, supplies of certain products become scarce. During January, when grouper fishing is heavy, they sometimes have to go as far as Ponce and Aguadilla for ice.

Juan Guzman & La Bellena

La Bellena is a vessel that several independent divers in Puerto Real use in association with other gear, including traps, beach seines, gill nets, lines, and harpoons. Its captain, Juan Guzman, owns a marine supply store and, in good weather conditions, operates and 4 vessels in all with 3 fishers per vessel. His vessels fish Boya 6, 8, 4, and 2 and sometimes, very occasionally, they venture into Bajo de Sico. The principal species they fish for are lobster, conch (in season), grouper, and trunkfish.

They sell their fish to a single buyer: a seafood restaurant in the area. (An interview with the owner of that restaurant confirmed that he was the only person he sold his catch to). Again, this conforms to the marketing strategies of other Cabo Rojo residents who organize fleets, with evidently loyal ties having developed between restaurant owners and those who organize fleets. Juan sells nearly nothing to the general population, saying that he rarely receives visits from either internal (Puerto Rican) or external tourists.

During the interview, he volunteered his environmental knowledge about the marine resources, which is among the most common doorways into a critique of regulations. Juan was no exception. After explaining about the conditions of fish and other marine species, pointing out in particular that sea turtles, protected forever now, were plentiful in many areas, he went on to say, "People who don't know anything of the sea, they put them to work in Natural Resources. They neither understand nor know anything. The resources lose." Table SW.6 shows the opinions of Cabo Rojo fishers regarding fishing resources based on the census data:

Table SW.6. Opinions of Cabo Rojo Fishers (n=103)

Variable	Percent
Status of Fishery Resources	
Better	4.9
Same	23.3
Worse	64.1
Source of Problems	
Pollution	12.6
Habitat Destruction	9.7
Overfishing	24.3
Government regulations	5.9
Weather	14.6
Seasonal factors	3.9
Other	4.0

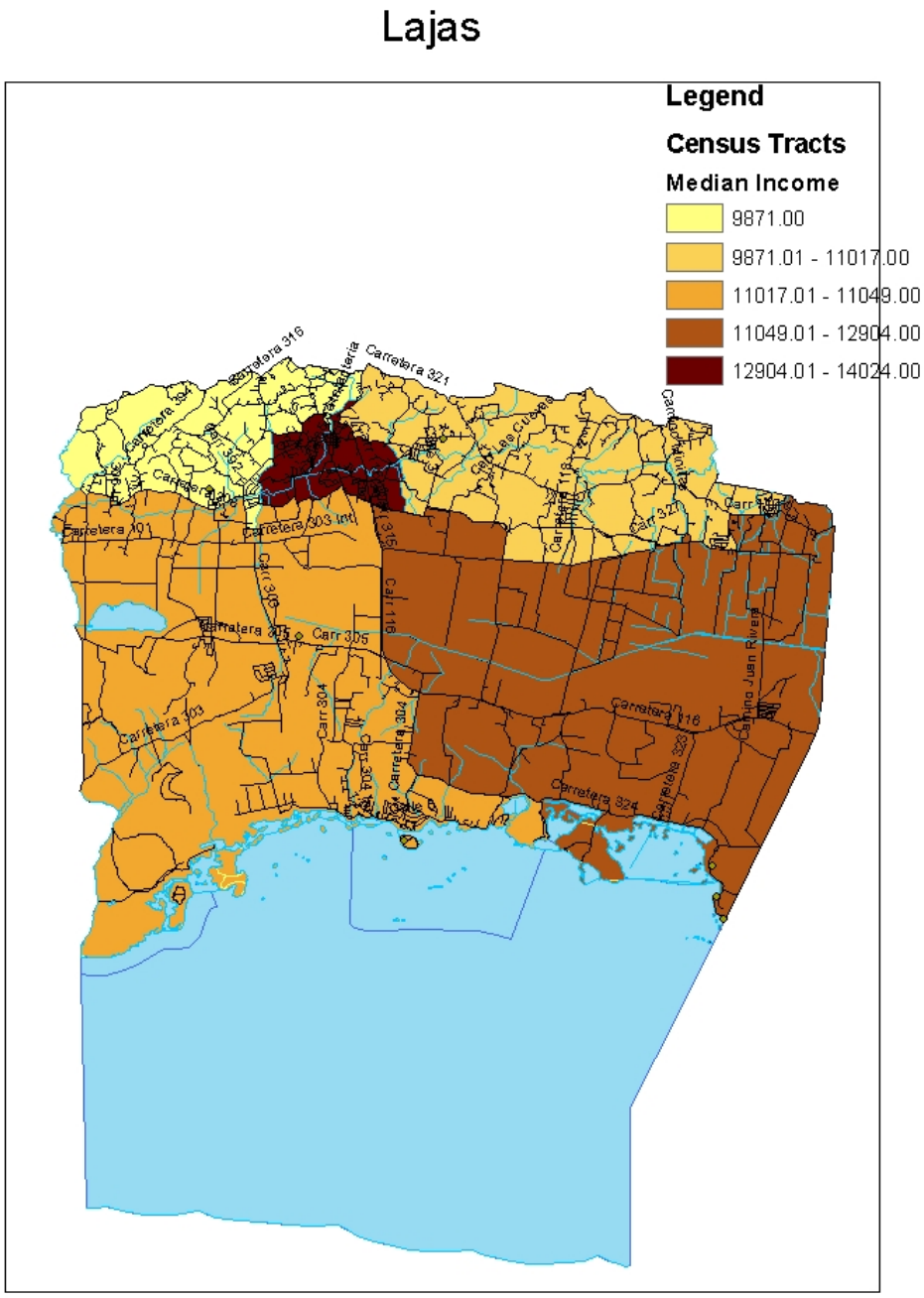
Cabo Rojo Summary

Cabo Rojo presents a unique case in the fisheries of Western Puerto Rico, but not only for its productivity and the size and diversity of its fishing community. The importance of fish dealers and marine suppliers in organizing fishing fleets in Cabo Rojo is a phenomenon worth further investigation, in that the dealers/ suppliers occupy potentially powerful positions vis-à-vis other fishers in the community, restaurant owners along Puerto Rico's west coast, and Department of Natural Resources personnel. That they supply primarily restaurant owners, with sales to *guagüeros* and the general public secondary in their operations, suggests that they are deeply tied into the restaurant trade and that a larger part of the west coast tourist trade depends on them for fresh fish.

Again, these are full-time fishers, supporting families from fishing resources while contributing to local society in ways that transcend mere economic calculus. The fish they catch enhances visitors'

experiences up and down the west coast of Puerto Rico. Well-known seafood restaurants in crowded weekend destinations like Joyuda, La Parquera, and Boquerón depend on fish from the lines, traps, spears, and other gear of Cabo Rojo fishers. While imported fish have cut into their markets, they maintain that they have been able to compete because of the high quality of local, fresh seafood, particularly highly prized species such as lobster and conch, as compared to imported fish. Revising slightly the words of one fish dealer quoted above, the fishers of Cabo Rojo defend themselves with quality.

Map SW.3. Lajas Coast



Lajas

La Parguera (or, simply, Parguera), one of the two significant fishing sites we profiled in Lajas, has been the focus of much social scientific work in recent years, primarily because of the changes the community has experienced over the past two decades, evolving from a quiet fishing village to one of the major Southwest centers of tourism and seasonal residence. In contrast to La Parguera, the nearby town of Papayo, a former site of salt manufacturing, is a small community to the east whose members have been attempting to benefit from spillover tourist trade from Parguera; Papayo remains, however, the sleepier fishing village that Parguera used to be.

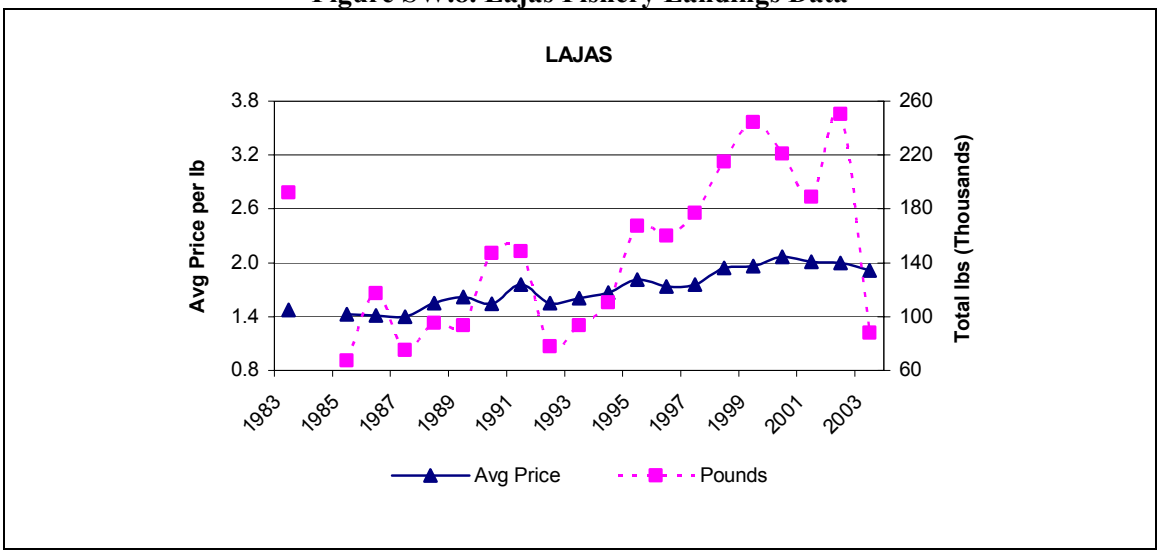
La Parguera's growth has, in the words of local residents, made it the *de facto* capital city of Lajas. They are referring to the popularity of the community among visitors from across the island, yet Lajas includes several other communities and manufacturing plants that have, like its neighbors, emerged from the ruins of the sugar industry.

Table SW.7. Lajas Demographic Data

LAJAS	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	16,326	15,375	16,545	21,236	23,271	26,261
Civilian Labor Force (CLF) [2]	5,297	3,864	4,621	6,341	7,795	7,689
CLF - Employed	5,212	3,716	4,327	5,197	6,030	5,662
CLF - Unemployed	85	148	294	1,144	1,765	2,027
Percent of unemployed persons	1.60	3.83	6.36	18.04	22.64	26.36
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		1,772	993	521	559	230
Construction		240	603	508	467	654
Manufacturing		520	1,018	1,402	1,532	1,154
Retail trade		348	415	589	810	611
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	N/A	19.9	25.8
Persons who work in area of residence [6]		2,940	2,288	2,568	3,174	2,433
Per capita Income (dollars) [7]			742	1,832	3,388	7,691
Median Household Income (dollars) [8]		854	2,130	4,906	7,675	11,384
Individuals below poverty level [9]			11,410	13,993	15,264	14,829
Percent of Individuals below poverty level			68.96	65.89	65.59	56.47

The municipality's statistics reflect a somewhat more robust economic picture than neighboring Guánica's, with a lower unemployment rate and a smaller proportion of people below the poverty line. It fares somewhat less well, however, than Cabo Rojo, its other neighbor to the north and west. The manufacturing sector in Lajas continues to provide some employment, and construction employment, some of which is fueled by the growth in Parguera, has increased over the past decade. The picture is still similar to that of other western municipalities, with double digit unemployment and over half the municipality living in poverty.

Figure SW.8. Lajas Fishery Landings Data



Fishing provides income and employment for significant portions of the communities of Parguera and Papayo, and the landings data from Lajas place it among the top three western municipalities. Its catches increased steadily through most of the 1990s but, like all other municipalities, have fallen recently. Nevertheless, fishing occupies a central place in the both communities of Parguera and Papayo. Rema Brusi's thesis (2003) argues that fishing is a central part of Parguera's identity; even many of the new and seasonal residents, who live in different parts of the town, consider the town a "fishing village," viewing this as a valuable part of its attractiveness. Similarly, the community of Papayo greets passerby with a large sign advertising its fishing heritage, although Papayo has not experienced nearly the level of gentrification that Parguera has.

Lajas History

Like Cabo Rojo, early in colonial times Lajas was under the jurisdiction of San German, and perhaps because it was closer it didn't separate from San German until well into the 19th century, in 1878. Prior to that time, its history was bound up with San German's, which exercised authority over most of western Puerto Rico. In 1514, the two municipalities of San Juan and San German dominated most of Puerto Rican territory, although highly unevenly. Settlers from San German, for example, attempted early settlements in the mid-16th century in what is today Añasco, only to be repelled by native Caribs and forced to move south and concentrate in and around what is today the bay of Guayanilla.

The settlements in Lajas were more secure than those further away, in part because San German officials considered them important territories. Fishing played no small part in this. Prior to the late 19th and early 20th century development of water control systems, Lajas's dry climate was not conducive to large scale agriculture. Animal husbandry and fishing, however, were important activities during the 18th and 19th centuries. With the development and sophistication of irrigation systems, however, Lajas began sugar and pineapple production, slowly marginalizing fishing as an important activity. La Parguera remained the core of the fishing industry, and Brusi's thesis records several historical narratives that testify to the importance of fishing to the town's identity.

Gentrification & Marine Resources in La Parguera

Despite the claims of many long-time residents and newcomers to the community, Parguera is hardly a sleepy little fishing village. The town has become a tourist center with a substantial number of temporary or seasonal residents. The latter tend to be professionals or upper middle class families who have either bought houses in the areas or built, illegally, *casetas*, the wooden houses extending from the mangrove forest into the bays around Parguera. Similar to places on the North Coast, gentrification is far advanced in Parguera. Rima Brusi's thesis, Living the Postcard: Place, Community, and the Production of La Parguera's Landscape, addresses the distinctly different images that people use to discuss Parguera: as a sanctuary, haven, and tranquil fishing village on the one hand, and as a site of "work, struggle, and contestation" on the other. Generally, the neighborhoods to the east of Parguera's downtown and primary road linking it to the rest of Lajas comprise its older, working class (fishing family) neighborhoods, while its neighborhoods west of the downtown have witnessed the most development oriented toward wealthier residents. An exception to this has been the fringe of *casetas* lining the coast—most of which are owned and occupied (at times seasonally) by wealthier families. Fishing remains an activity in Parguera, though there are signs that fishing households are deeply intertwined with, even while they are being marginalized by, the tourist industry.

La Parguera and Las Parcelas

Most of the fishing families in Parguera live in the parcelas on the eastern end of the community, but evidence of their integration into the tourist/ seasonal resident economy is seen in the ubiquity of recreational crafts stored in the parcelas residents' yards and drives, often beside commercial vessels or gear. Vessel storage has become a major part of the Parguera landscape. Not only do year-round residents, many of whom are fishers, store vessels for seasonal residents, but on the road leading to Parguera there are boat storage (dry dock) facilities and recent observations of the *casetas* lining the mangroves have found that they constitute one of the largest marinas on the island (Valdés Pizzini, personal communication). Whether for commercial purposes or recreation, Parguera's attachment to the sea is deep and unmistakeable.

In her dissertation on Parguera, Brusi relates local historical accounts in which long-time, year-round residents suggest that Parguera began as a working class fishing community during the land redistributions of the early 1940s. The original *parcelas* program, designed to provide the working poor of Puerto Rico with house lots and housing, in part to free them from a state similar to serfdom, was also a program oriented toward community formation: along with housing, parcelas programs often created schools and *colmados* (small stores) to generate a sense of community.

Today the eastern section of Parguera remains the neighborhood of the working class, with many fishing families, despite that some of the families have sold their lots to people from outside the community. Much of western Parguera has been developed into condominiums and other housing units for seasonal residents, and much of the infrastructural development lining Parguera's shoreline has been oriented towards tourism. These include seafood restaurants/ bars, boat rentals, excursions to the phosphorescent bay, dive shops that give dive lessons, a weekend crafts market, and several hotels and other temporary accommodations. All of these cluster around a five- to six-block area along the Parguera waterfront, the center of which is a long pier where the vessels leave every night to view the phosphorescent bay. Outside of the main cluster of these amenities lie the commercial fishing infrastructure of landing centers and seafood markets.

Villa Pesquera of Parguera

West of the center of town, this Villa Pesquera includes two monuments to fishing in Parguera and Papayo: a statue of a fisher and mural about fishing, both of which include text suggesting that fishing is a noble occupation, with moral economic significance and deep roots in the community. Beneath the fisher is a sign that reads (in translation): *"The Fisher. This monument is dedicated to all the fishers who day by day encounter the sea's adventures for the sustenance of their families." [*"Este monumento está dedicado a todas las pescadores que dia a dia se entregan a las aventuras de la mar para el sustento de sus familias."*]*.

"The Pescador" monument faces a mural that is visible from the sea and from the association's pier, but not visible from the neighborhoods of Parguera or the road, which depicts two fishers—one old, one younger, one standing on the dock and the other wielding a knife (perhaps cleaning a fish)—and reads: "Parguera and Papayo: the cradle of fishers."

Figure SW.9. *"El Pescador,"* La Parguera

Figure SW.10. *"Parguera y Papayo, Cuno de Pescadores"*
Parguera and Papayo, Cradle of Fishermen

These two artistic celebrations of fishing resonate with Brusi's thesis—and the words of those she interviewed for her thesis—that Parguera traces much of its identity to a fishing heritage. This heritage, indeed, is something that Brusi suggests the tourists, newcomers, and seasonal residents wish to preserve, viewing it as adding value to the community's ambience. However charming or quaint these images may seem, they are not mere tourist attractions but reflect a working waterfront and a viable, highly productive fishery with slightly under half affiliated to an association and about 40% full-time fishers.

Table SW.8. Association Membership and Hours Spent Fishing, Lajas (n=62)

Variable	Response
Percent Affiliated to Association	45.2
Hours engaged in fishing activity	
0 – 20	19.4
21 – 30	35.4
31 – 39	3.2
40	33.9
> 40	6.5
Mean hours	31.31 (sd =10.094)
Minimum	8
Maximum	49

Fishers here use a wide variety of gear and fish for a wide variety of species; on the association's dock are gill nets (*filetes*) and traps, and the vessels that tie up there have winches for lines or hauling traps. The census data show that, in fact, the fishers of Lajas are among the most versatile in terms of their use of gear:

Table SW.9. Gear Used by Lajas Fishers (n=62)

Variable	Percent
Beach Seine	14.5
Trammel Net	25.8
Long Line	9.7
Troll Line	48.4
Fish Trap	46.8
Gill Net	71.0
Cast Net	54.8
Hand Line	83.9
Rod and Reel	48.4
Lobster trap	1.6
Snapper Reel	14.5
Winch	8.1
Skin	0.0
Spear	37.1
Lace	16.1
SCUBA	11.3
Gaff	57.4
Basket	6.5

Similarly, fishers in Lajas fish a wide range of territories, with the fishing reefs and the continental shelf the most widely used:

Table SW.10. Fishing Territories of Lajas Fishers (n=62)

Variable	Percent
Shore	11.3
Continental Shelf	85.5
Shelf Edge	38.7
Oceanic	21.0
Reef Fishes	93.5
SCUBA Diving	0.0
Skin Diving	17.7
Pelagic	16.1
Bait	40.3
Deep Water Snappers	17.7

Given the range of fishing territories, styles, and gears used in Lajas, it is not surprising that in Parguera should live one of the most well-known fishers and seafood dealers in Western Puerto Rico, a man we call here Antonio Hernández (pseudonym). Antonio is an assemblyman as well as an active voice for the two fishing associations in Parguera, and our interview with him revealed not only the ways in which Lajas fishers exploit the marine environment, but also many of the problems facing the fishery. Like fishers in other fishing communities around the United States, Antonio complained about excessive regulations, imports, and protecting fish stocks to the point of driving fishers out of business. Twice he said, adamantly, that he realized that they needed to preserve fish stocks for future generations, but the current wave of regulations seemed to him hostile toward commercial fishers. He said that he saw king mackerel for 79 cents a pound in Pueblo (the large Puerto Rican supermarket chain). They sell local *sierra* (king mackerel) for $2.00. They also import *chillo* (snapper) from Taiwan.

This was part of his general disagreement with imports from Mexico and Taiwan, which he complained were killing them. He said that some of the size-limit regulations were just ridiculous, repeating what other fishers had told us: if you pull up Yellowtail snapper under 12", Chillo, or Nasau Grouper under 26" (which you aren't supposed to keep), you're pulling them up from a depth of 1000 or more feet and hence you have to kill them (their eyes pop out).

Mesh size restrictions, he believes, are fine, but most of the regulations are no longer in the best interests of commercial fishermen. He has been fishing commercially for 40 years and has three children, at least one of whom (a 35-year old) he hopes will be able to make a living fishing.[2] He also said that he fishes with his nephews (they are his *proeles*). His youngest, a daughter, is 28 and on the police force (he mentioned this to make clear that his fishing had helped to produce a public servant).

He also complained about the costs of fishing/ boating licenses. He claims to pay:

- $100 for a boat registration.
- $50 for a commercial fishing license.
- $25/ species for certain species (like a duck stamp).
- $35/ year for another, undesignated expense.

He said he also needed to have a license for several species.[3] In nearly the same breath Antonio spoke of recreational fishermen coming into Parguera, charter boat captains as well as average sport fishermen, selling fish in Parguera. "This affects the market," he said, and at a time when imports are already depressing the prices of fish. He said that the unlicensed recreational fishers are bringing conch from Jamaica, Santo Domingo, and St. Croix.

He is a member of the association as well as an operator of the fish market. The association has a *muelle* (pier) and there are two associations in Parguera, one right across the road and parking lot from his market.

In terms of changes in Parguera in the past ten years, he first said that boats are now larger, *mas grande*, and *mas rápido tambien* (faster, too). Everything has changed. Now they can fish further from shore and in deeper water. The *trasmallo* (trammel net) is now plastic, and the *nasa* (trap)*, chinchorro* (beach seine)*,* all gear have changed, making fishing easier with more sophisticated equipment.

At the same time, the importance of species have changed, in part due to the ability to travel farther from shore. He said, *"Parguera fue una villa pesquera*: Parguera was a fishing village… Now it's the capitol of Lajas." Among the new regulations he mentioned the one barring public consumption of alcohol: drinking in the street. He also said that Parguera used to be a calm (*tranquilo)* town… Now they have new jobs, new local markets for seafood, citing the wealth of seafood restaurants as well as the smaller stands and businesses where they sell *empanadillas* and *pinchos.*

Annual Round:

January – March: "The first five to six months of the year are the most productive."
All of the following species they catch with rods & reels & hand lines:

[2] This is, in short, a moral/ traditional claim on fishery resources & his desire to participate in the design and implementation of regulations—fishing as part of family and community, as part as the continuity of Parguera; this may be why defining community at least with reference to places is important.
[3] DRNA dispute these figures, claiming that they are overestimated.

- #1 species: Dorado, which they catch 30 to 35 miles from shore with lines. He added an ecological knowledge comment that the migrations of Dorado range as far away as the Dominican Republic, this time of year, but during other times of the year, they circle close to the African coast. Pelagic species feed 24 hours a day, he added, and sometimes they are fished with harpoons. During this time of year, fishers make 4 to 5 trips per week. They fish for Dorado from the drop-off out (deeper waters). To catch Dorado, sometimes they keep the male in the water and the females will school around it and strike. They will also feed around a floating gill net (which may act as a fish aggregation device). They have caught 750 pounds on one gill net.
- #2: Colirubia (yellowtail snapper). These are fished closer to shore, only 3-4 miles out, over the platform.
- #3: Sama (mutton snapper).

January & February, they catch Red Hind over the platform with handlines. Landings are highly variable and difficult to relate with any accuracy. Besides, he said, 75% of the fishers don't report landings.

June/ July/August through October: #1 species is *sierra* (king mackerel), but because it's hurricane season they stay closer to shore. Fishing season drops. They fish for *sierra* at the drop off, in around 200' of water. He said that fish depend on the lunar cycle and so the fishers fish for *sierra* during the first few days of a moon. Many fish are caught with changes in the moon. It is also easier to fish during the moon. *Sierra* go deep down during daybreak, rising at night to feed. Four days after the new moon is the best time to fish for sierra. In addition, many second-class fish, selling for around $1.25/ pound are consumed during the summer.

September/ October to November/ December: Fishing slows down during these months, particularly during Nov-Dec, and they change gears, to traps, and fish nearer the reefs. They get lobster during this season. In December, during Christmas season, people eat pork *pasteles*, so fishers need to keep fish in the freezer. They're tired of eating pork and switch to fish in January.
Other reef fish they target include: Parrot fish, porgy, and grunt.

Fishing Practices

Why do the Parguera fishers shift among gears? It depends of the availability of fish and the kind of fish. For example, during the times of year pelagic species such as Dorado school through the area, they are more likely to use troll lines, shifting to deep water rigs when they target snapper-grouper species. It also depends on the time of day and the amount of bait he has on hand. If he has a lot of bait, he will fish differently, targeting those species that hit on whatever kind of bait he happens to have (e.g. ballyhoo for pelagics). He gives fish to his neighbor because she brings him cups of coffee from time to time. Many of the fishers who sell to Antonio fish at night and bring their fish to him before he is awake, putting them into his freezer themselves. Obviously, these relationships involve trust; the fishers stop by the following afternoon for their money.

Antonio also speaks on behalf of the fishing community, both as fisherman and assemblyman. He said that he knows that many fishers have turned to smuggling, drugs and illegal immigrants from the DR, but he reports these offenses (this is similar to fishers in the Gulf of Mexico reporting toxic waste dumping). Nevertheless, he does support civil disobedience in the case of the regulations released in July, 2004, saying that he believes that most of the fishers will resist the new licensing requirements by not filling out the trip tickets.

Many of the women who are in fishing households have found work cleaning rental houses, and as noted earlier many of the houses store boats for recreational boaters and other temporary residents. In addition,

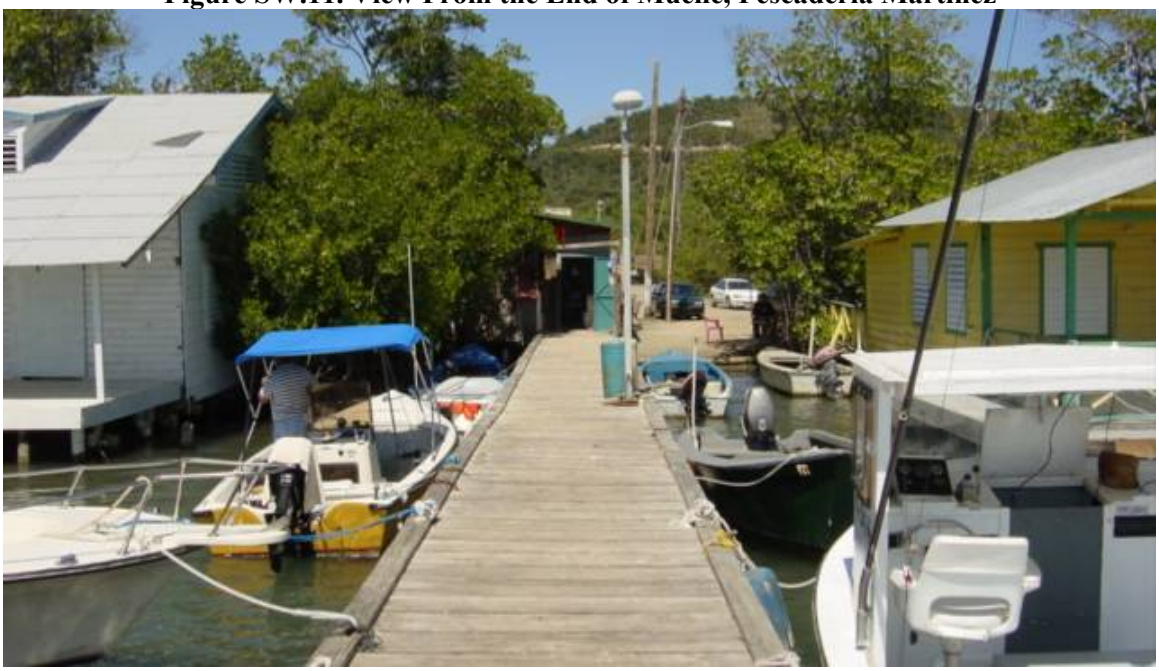
people will buy fish directly from fishermen, at a high price, and then carry these fish to restaurants to have them cooked. These are three economic benefits of gentrification.

Pescadería Martínez

This is a relatively new landing center where from 8 to 10 fishers land their catches. It sits on the water. One of the freezers was full of *carnada* (bait), which was ballyhoo, and the others with dorado and a few jacks that looked like crevalle Jacks or amberjacks, but they were difficult to identify because they were wrapped in plastic. In addition to the freezer facilities, the landing center has a nice pier and sells ice and fishing supplies.

Like Antonio, Martínez reported that *sierra* were the most important species caught here during the summer months, usually with a *cordel* (hook-and-line rig). At certain times of the year, however, he said that they rely on trammel nets, but most of the time they use either *cordeles* or traps. He said that the fishers who sell to him have lockers in the Villa Parguera, but that membership in the association is weak because the government has given them so little assistance besides building the piers and other facilities.

Figure SW.11. View From the End of Muelle, Pescadería Martínez



He listed several species that were important to his market, in addition to *sierra:* snook, yellowtail snapper, other snappers, and grouper; with nets they catch primarily trunkfish and lobster. They fish in front of El Faro (west), Playa Santa (in Guanica, to the east), and outside the cays along the southern shore. Some of the fishers who fish for snapper go to Bajo de Sico, Boya 6, and Abrir la Sierra.

In former times, when he had a larger vessel, he used to fish in the Mona Passage for deep water snapper, but has since gotten rid of his vessel. He said during those times he was able to catch around 300 lbs. and sell them for $1,000. Now his best market are the seafood restaurants, but most of those he sells to also buy seafood from outside of Parguera; sometimes he sells to restaurants as far away as San Juan, when he has a large supply of fish. The rest he sells directly from his shop, at retail prices.

According to him, the association in Parguera really isn't functional. He said they haven't been able to agree on much of anything regarding the business of the association, and that their assistance from the government has been haphazard. Currently, he claimed, instead of the Department of Agriculture helping them, the Department of Natural Resources is hassling them. In response, many fishers have learned to rely on one another; he commented that he helps fishers because they are good people and they help him as well.

Papayo

One of the main roads in Papayo ends at a pier that typically has about 20 boats moored on either side of it. This is a Department of Agriculture/ Villa Pesquera site, and therefore a potential association, but we spoke with some fishers who said that there had been a continuous lobbying effort to get more facilities than a pier. This pier is the "property" (in the sense of usufruct rights) of commercial fishers, and there is a locked chain across the entrance to the parking lot.

Figure SW.12. Papayo Muelle

Many of the boats have nets in them, and in the community one can see men sitting around freshly repaired boats outside a small workshop and repairing nets. Fishers here claim that the fishers of Papayo were attempting to get more attention from the government. The sign at the entrance to the town suggests that this is a fishing community, and recently the community in general has been attempting development aimed at some of Parguera's tourist trade.

One informant, Rudolfo, told us that there were around 30 fishers using the pier who lived in Papayo, but that these thirty invite friends of theirs to use the facility and people come from other locations as well, leaving to fish with diving tanks, nets, traps, and lines. Rudolfo himself used to have a large boat, but he sold it to a German. All 20 boats moored around the *muelle* were the typical 18' to 20' yolas you see everywhere, most laden with filetes (gill nets) and mayorquines/ trasmallos (trammel nets):

Figure SW.13. Yolas in Papayo with *Redes*

Figure SW.14. Yolas in Papayo & Net Platform

The fishers of Papayo, according to Miguel, sell independently to people in the neighborhood or to people who happen to know they have fish, sometimes to the fish markets in Parguera. The following table shows that Lajas fishers in general market fish themselves, usually, and secondarily to associations and fish dealers. The Papayo association has no fish market.

Table SW.11. Fish Marketing Behaviors in Lajas (n=62)

Variable	Percent
Private	0.0
Fish Buyer	22.6
Association	21.0
Walking	41.9
Restaurant	9.7
Own Business	6.5
Gutted	71.0
Ice	59.7
None	17.7

Finally, we present data from the census concerning Lajas fishers' views about the resource, which show that about a third attribute changes to overfishing but a higher proportion to crowding, reflecting gentrification.

Table SW.12. Lajas Fishers' Opinions of Fishery Resources (n=62)

Variable	Percent
Status of the Fishery Resources: better	3.2
Status of the Fishery Resources: same	21.0
Status of the Fishery Resources: worse	74.2
Pollution	12.9
Habitat Destruction	11.3
Overfishing	30.6
Lots of vessels	38.6
Weather	11.2
DRNA Regulations	1.6
Lots of fishermen	17.7
Noise	3.2
Tourism	1.6
Water quality	1.6

Northeast & Island Municipalities:

Fajardo, Ceiba, Vieques, Culebra

Many parts of northeastern Puerto Rico, as well as the two island municipalities of Culebra and Vieques, were settled slowly and sporadically, with the region's past development almost opposite current demographic trends. Today, it is primarily the region's coastal zones (including near-shore waters) that are witnessing the most rapid growth, development, and crowding, with new marinas and oceanfront villas nearly always under construction, yet during the first centuries of colonization, in his brief historical account of Ceiba, Toro Sugrañes writes, *"Toda este litoral este de nuestro Isla estuvo muy escaso de población"* (1995: 109) ("All of the eastern coast of our island was scarcely populated"). The reasons for this are varied, but derive in part from the reputation of coastal zones, noted earlier, as dangerous, unhealthy, and hazardous places, full of smuggling, piracy, and disease. Primarily because of a lack of sources of fresh water, Culebra was the last of these municipalities settled, despite that it was used as temporary port and source of wood for Taínos, pirates, and others prior to permanent settlement (Iranzo 2004).

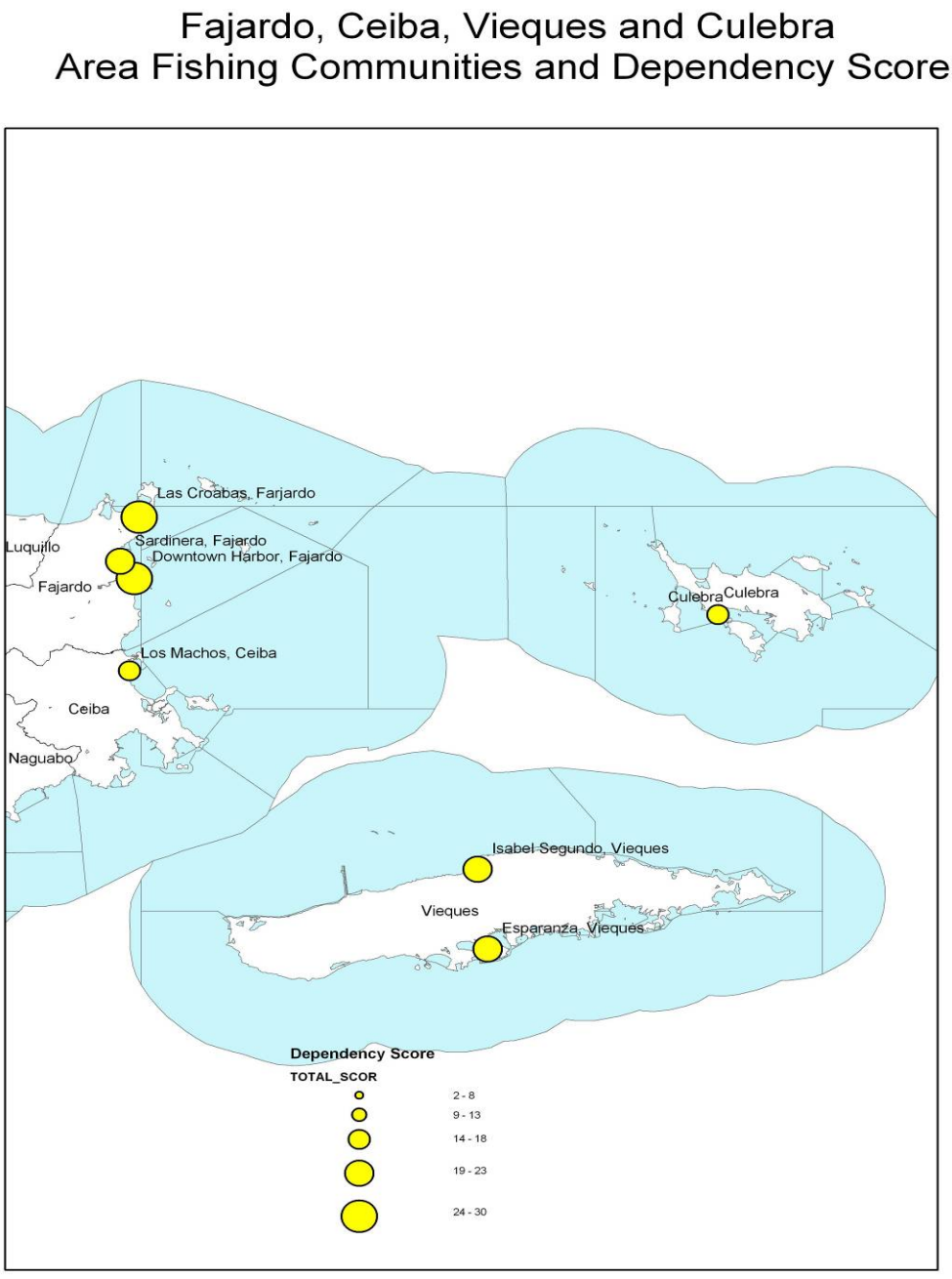
Among the early stimulants to population growth in this region was its strategic importance in the sea-lanes. From the mountains of Fajardo, one can easily spot ocean-going traffic from Europe; Vieques and Culebra serve as gateways to the Lesser Antilles. Iranzo notes that the two island municipalities constitute the nexus between the Greater and Lesser Antilles, adding that the two archipelagos have experienced distinctly different ethnic and cultural histories (2004). The fact that these municipalities span the territory where Greater and Lesser Antilles meet has been important in both their development and in how they differ from one another, including the participation of their residents in fishing. In many ways, Culebra and Vieques share more with the smaller islands to the east and south, including the U.S. and British Virgin Islands, than with Ceiba and Fajardo. Families of fishers and merchant seamen have historically moved among St. Croix, Culebra, and Vieques, resulting in intermarriage between Spanish-speaking Puerto Ricans and English-speaking Afro-Caribbean peoples (Griffith and Valdés Pizzini 2002).

Despite close historical ties among the outer islands, Ceiba and Vieques share the presence of U.S. military bases, and U.S. troops relied heavily on Fajardo as a military staging area during the Spanish-American War (Toro Surgañes 1995). Ceiba's military base, Roosevelt Roads, which is currently being phased out as a military installation, covers much of Ceiba's coast line and is responsible for keeping much of the original marine habitat, particularly the mangrove forests, intact. Local fishers interviewed in Ceiba during the summer of 2005 claimed that their mangrove forests were in nearly pristine condition. By contrast, the bombing of Vieques by the U.S. Navy has been severely environmentally destructive, ruining marine substrates, as well as dangerous and deadly to humans. The bombs have also destroyed fishing gear that fishers have not had time to remove.

The waters of this region attract fishers, divers, and boaters from the four municipalities, yet also many from the north coast, from farther south along the east coast, and from the Virgin Islands. We encountered fishers in Dorado, west of San Juan on the north coast, who routinely fished the waters between Culebra and Fajardo. As noted in the historical section above, Jarvis lamented the contrast between this area's rich sportfishing resources and the lack of tourism infrastructure. Since the 1930s, Farjardo in particular has developed as one of the principal tourist and boating destinations for the people of the San Juan metropolitan area. Its lodging facilities now range from exclusive resorts/ resort communities to small, inexpensive guest houses, and its dozens of seafood restaurants are equally diverse, with roadside stands selling cups of conch salad and seafood fritters for under $2.00 neighboring establishments where diners easily spend $30.00 to $50.00 per meal. On weekends the traffic between San Juan and the east-northeast coast is thick nearly around the clock. The boat storage and service

facilities in both Fajardo and Ceiba ensure that a good deal of this traffic is oriented toward recreational uses of the waters, its small islands and islets, and the two island municipalities of Culebra and Vieques.

Map NE.1. Northeastern & Island Municipalities



Fajardo

Situated within an hour and a half drive of San Juan, on the main island's northeastern tip, Fajardo has long been a tourist destination for Puerto Ricans and others, attracting recreational boating traffic from across the Caribbean and the U.S. mainland and providing infrastructural support for at least two commercial fishing communities, three Villas Pesqueras, several recreational fishing sites, and some of the most elaborate marinas in Puerto Rico. Seafood restaurants abound. In the downtown harbor, the Port Authority maintains a ferry terminal for trips to Vieques, Culebra, and St. Croix, and smaller ferries use a second pier for shorter trips to nearby small islands. At least two other piers in the downtown are used for commercial and recreational fishing. Commercial fishing from the downtown alone, between the ferry terminals and a narrow river that the government plans to canalize, supports two private fish markets, a Villa Pesquera, and a well-known restaurant that sits on the border between two parcelas, Maternillo and Mansion del Sapo, that, together, form a commercial fishing community.

Table NE.1. Fajardo Census Data

FAJARDO	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	22,116	18,321	23,032	32,087	36,882	40,712
Civilian Labor Force (CLF) [2]	5,605	5,080	6,518	8,202	12,712	12,448
CLF - Employed	5,183	4,776	6,209	7,096	9,886	10,131
CLF - Unemployed	422	304	309	1,106	2,826	2,317
Percent of unemployed persons	7.53	5.98	4.74	13.48	22.23	18.61
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		1,076	326	99	123	68
Construction		380	500	519	796	896
Manufacturing		892	1,109	1,158	2,048	1,305
Retail trade		592	795	1,139	1,692	1,277
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	28.4	20.7	23.9
Persons who work in area of residence [6]		3,800	3,964	4,365	6,902	6,325
Per capita Income (dollars) [7]			1,160	1,925	4,148	7,852
Median Household Income (dollars) [8]		1,114	2,917	4,783	9,465	15,410
Individuals below poverty level [9]			12,903	20,565	19,771	17,045
Percent of Individuals below poverty level			56.02	64.09	53.61	41.87

Fajardo's comparatively low (for Puerto Rico) unemployment rate and the low commuting time suggest that most of its residents are finding work within or near the municipality, rather than commuting to San Juan. Like other coastal municipalities, however, most economic sectors besides construction have experienced decline. The 100 jobs added to construction between 1990 and 2000 were off-set by job losses of over ten times that in the other sectors. Given continuing marina and other development in the area, the construction sector is likely remaining robust.

Figure NE.1. Fajardo Landings Data, 1983-2003

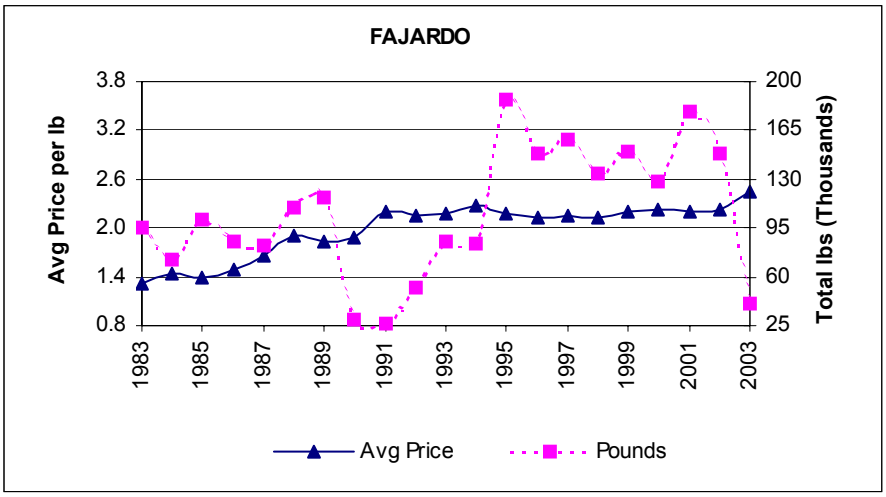
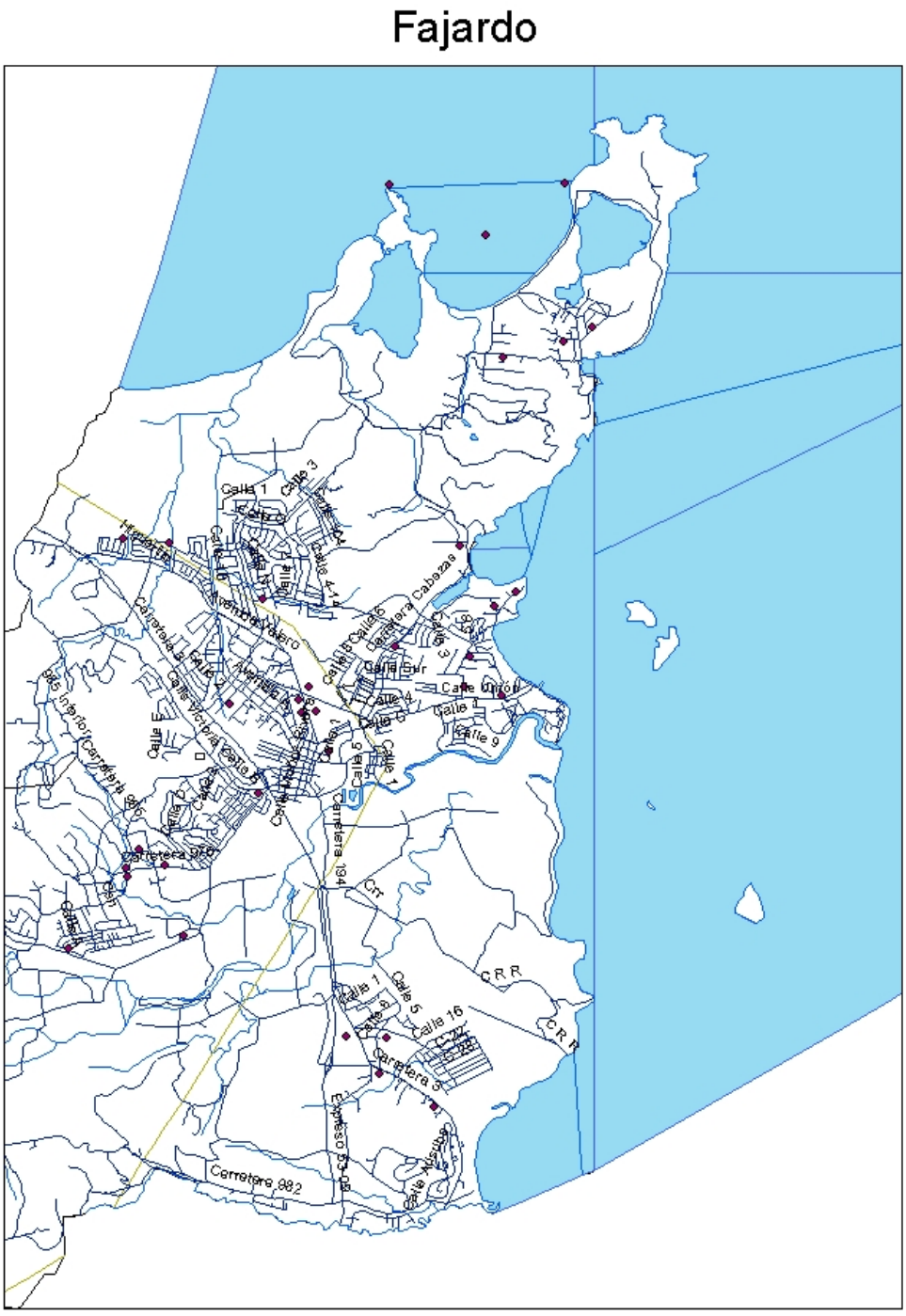


Figure NE.1 shows that fishing from Fajardo has fluctuated dramatically over the past twenty years, rising early in the 1990s to its high in the middle part of that decade and, thereafter, remaining relatively stable until 2002, before a precipitous drop. Amazingly, price during these swings in supply rises relatively slowly, by an average of a dollar per pound over the 20 year period shown (correlation coefficient = .2029).

The map below illustrates some of the natural features responsible for Fajardo's popularity with the boating public. Blessed with several natural harbors and the estuarine *Rio Fajardo*, and facing several small, inhabited and uninhabited islands with highly desirable beaches, Fajardo's boating population enjoy shelter and access unlike most of the north coast and much of the rest of the main island. Fishing from Fajardo takes advantage of these features, the local and visiting fishers hailing from marinas, ferry piers, seafood markets, and Villas Pesqueras.

Map NE.2. Fajardo



Commercial fishers from Fajardo benefit from the tourists through their consumption of seafood, of course, yet some also supplement their fishing incomes by providing water taxi services to tourists visiting its outer islands. Such activities have made Fajardo's fishing families a crucial part of the local tourist trade, influencing the time fishers can devote to fishing, the species they target, and the characters of their local associations. Similar to Ponce's La Guancha, connections between commercial fishing and tourism in Fajardo have created a new type of fishing community, one that enhances local tourism and increases access to marine environments among the general public.

Fajardo's importance extends beyond the robustness of its tourist industry or the character of its fishing fleets. Historically, Fajardo has enjoyed (and suffered) a strategic location in the sea-lanes, on the cusp of the waters that join the Greater and Lesser Antilles with long-term connections to Culebra, Vieques, and the U.S. and British Virgin Islands. Of Fajardo, Toro Sugrañes makes the same observation that Iranzo made of Culebra and Vieques, writing that Fajardo is: *"un punto de paso entre Puerto Rico y sus Islas al este y entre nuestra Isla y las Antillas Menores"* (a point of passage between Puerto Rico and its eastern islands and between our island and the Lesser Antilles—1995: 148). Fajardo's location has resulted in its being occupied by foreign invaders, including the United States, on more than one occasion, and this history remains a significant force in the municipality's heritage today.

Fajardo History

Like most coastal municipalities, Fajardo's economic tie to the sugar industry shaped much of its history, and Fajardo's status as a port made it doubly important for commerce involving agricultural products. Historically, Fajardo shipped sugar and calcium carbonate to the United States.[4] Of the four municipalities of this region, Fajardo was the first that was permanently settled, primarily due to its advantageous location on the island's northeastern corner. Toro Sugrañes reports that Fajardo had around 13 sugar mills at the end of the 19th century, yet through the 20th century sugar production became more concentrated. By 1950, La Central Fajardo, owned by Eastern Sugar Company, had monopolized sugar milling in the region, and in that year produced 126 tons of cut sugar cane. Following this, however, sugar production began to decline; La Central stopped production altogether in the 1970s, leaving behind several abandoned buildings on the southern edge of the municipality's principal town and two distinctive towers near the ferry terminals.

Even as sugar production was declining, tourism was beginning to grow. In the 1960s, El Hotel Conquistador opened, becoming a major resort in 1993 with an investment of $200,000,000. During this same time period other, smaller hotels and guest houses, along with seafood restaurants, were established. On one of the outer islands visible from shore, developers built two condominium towers with 30 floors apiece—at the time the highest residential dwellings in Puerto Rico. Today eleven marinas enhance this tourist and luxury residential infrastructure.

Fajardo also took advantage of the 936 tax laws—or the laws that granted tax breaks to companies who produced in Puerto Rico—creating three principal industrial zones with 30 factories that produce primarily medical supplies, pharmaceuticals, and electronics. Toro Sugrañes reports that these factories created "hundreds of jobs" and that their value surpasses that of the investment in El Conquistador. He views Fajardo as one of Puerto Rico's rising stars, believing that it will become a major port city in this century.

[4] This is a crystalline compound that occurs naturally as chalk, limestone, and other forms that has commercial uses in medicine and dentistry.

Downtown Harbor: Puerto Real, Maternillo, and Mansion de Sapo

Fajardo's historical importance as a sailing and shipping port, with its large and small ferry terminals and eleven marinas, has complemented the three waterfront neighborhoods that, together, constitute one of its two fishing communities: Puerto Real, Maternillo, and Mansion de Sapo. Together, these three neighborhoods combine their marine infrastructure, fish markets, seafood restaurants, and commercial and recreational fishing families to create a community dependent on fishing and marine resources. Physically, the three neighborhoods are located at the end of a single road leading to the downtown harbor and ferry landings; this one road into and looping through the community serves as its principal link to the rest of the municipality, yet it also acts as a kind of border that unites the three neighborhoods into one community. A second border, the Rio Fajardo, meanders along the edge of Mansion de Sapo and Maternillo. The third border enclosing and defining this community is the sea.

Puerto Real

Of the three neighborhoods, Puerto Real is less clearly tied to fishing than either Maternillo or Mansion de Sapo. Puerto Real is organized around the commercial ferry traffic and the boat launching, storage, and other marine infrastructure serving the boating and shipping traffic. Nevertheless, we include Puerto Real as part of this fishing community because its multifaceted infrastructure complements and offers support to the recreational and commercial fishing families living in the three neighborhoods.

We include Puerto Real for other reasons as well. First, for example, during one of our visits to Puerto Real, we spoke with two recreational/ subsistence fishers from the area who used one of the smaller ferries to Palimino (a small island near the Fajardo coast), departing from a municipal jetty, to transport several reel rigs and other fishing gear to spend the day fishing from the island's shores. They were a man and his son, the man around 55 and deeply tanned, weathered, from much time in the sun, and the son around 30. They were using long-lines on spools—gear they called *carretes*—filling two five gallon buckets with these rigs, which amounted to between 8 to 10 such rigs, each fitted with many hooks. When asked what they caught, they said "*todo*" (everything) specifying that they caught primarily *tiburón, pargo,* and *sama.* Both the volume of gear and the range of species caught suggests that these figures are primarily subsistence fishers, most likely included in that group that fish for food as well as supplemental household income. The symbiosis that has developed between such recreational/ subsistence fishers and the water transport systems and infrastructure suggests that some infrastructural development, when open to the public at least, can benefit the fishing community, improving access rather than reducing it, as much marina development does.

The marina/ recreational boating traffic in Puerto Real is heavy, particularly on the weekends. Some fishers supplement their fishing incomes by ferrying passengers to the small outer islands of Palimino, Isleta, and Icacos. The latter is an uninhabited island known for its beaches and snorkeling, and the others are also popular daytime locations for bathers and recreational fishers. Puerto Real has three commercial piers and a jetty that ends in a ramp where tractors from a boat storage facility launch vessels. Another wooden pier extends out into the bay between the jetty and the pier for Isleta ferries. The commercial piers are for the ferries and cargo vessels. At least two ferries travel between Isleta and the second pier, though the pier nearer to the customs house are for ferries to Culebra and Vieques or cargo vessels. The jetty is private, where they charge $30 to launch vessels and $25 to launch jet skis (including parking).

As noted earlier, Puerto Real, Maternillo, and Mansion de Sapo all adjoin one another in the area more generally known as Fajardo's downtown harbor and waterfront. Here the guesthouses, hotels, restaurants, and ferries to Vieques and Culebra draw tourists and others who store their boats in Marina Puerto Real. While some of these visitors have little to do with the fishing families of the area, others filter down the

road along the bay to eat from restaurants or buy from fish markets that Maternillo and Mansion de Sapo supply. Puerto Real businesses supply ice and other supplies to fishers throughout the area. Finally, developments in Puerto Real affect its residents and those from Maternillo and Mansion de Sapo. Proposed expansions to Puerto Real Marina, for example, will affect all fishers in the area, and many fishers oppose this growth.

Figure NE.2. Recreational/ Subsistence Fisher Loading Gear onto Small Ferry for Palimino Island, Fajardo

Recreational boating is more popular than recreational fishing from Puerto Real Marina. Of the around 108 boats currently using the marina, only six, according to the marina administrator, are used as recreational fishing crafts regularly. We encountered this five to six percent figure at other Farjardo marinas as well. The cost of slip space in the marinas may prevent all but fairly well off recreational fishers from using them in any case: monthly cost for a 20' vessel at Puerto Real Marina ranges from $100 to $175, and up to $200 or more for larger vessels. The marina owns a pier and helps its clients launch and land their vessels with a tractor.

Despite opposition from local fishers, the owner of the marina, with the support of the mayor of Fajardo, is currently planning to develop dry stacks for 400 boats, an additional 192 slips (for a total of 332), a parking ramp with two levels, a 200' pier, and five commercial lots for restaurants, shops, and other stores. The owner also promotes classes for study leading to the licensing of captains at Fajardo's vocational school, hoping to professionalize maritime industry in the municipality. Those who support the plan argue that it will generate employment, enhance access to the coast, and create a more tourist-friendly environment, thereby contributing to the region's economic growth.

Figure NE.3. Puerto Real Marina Tractor Assisting Recreational Boaters, Fajardo

It is unclear how the expansion of the marina will affect the downtown harbor area or its commercial and recreational fishing communities. Puerto Real Marina is on the edge of Puerto Real that joins Maternillo, and Maternillo and Mansion del Sapo form the heart of the commercial fishing community. This proximity may underlie fishers' opposition to the expansion, as the pier the marina currently uses is private and future marina infrastructure, presumably, would be private as well.

Maternillo and Mansion del Sapo

Both bordering parts of Puerto Real, these two neighborhoods—especially Maternillo—form the heart of Fajardo's downtown fishing community. They are less integrally tied to the commercial shipping and transportation systems than Puerto Real and more directly dependent on marine resources to supply their seafood restaurants, private fish markets, the Villa Pesquera called *Pescaderia Maternillo*, and their own kitchens. As a testament to the depth of fishing history that characterizes this community, one fisher in Maternillo builds boats using caulking methods that have been displaced nearly everywhere with fiberglass.

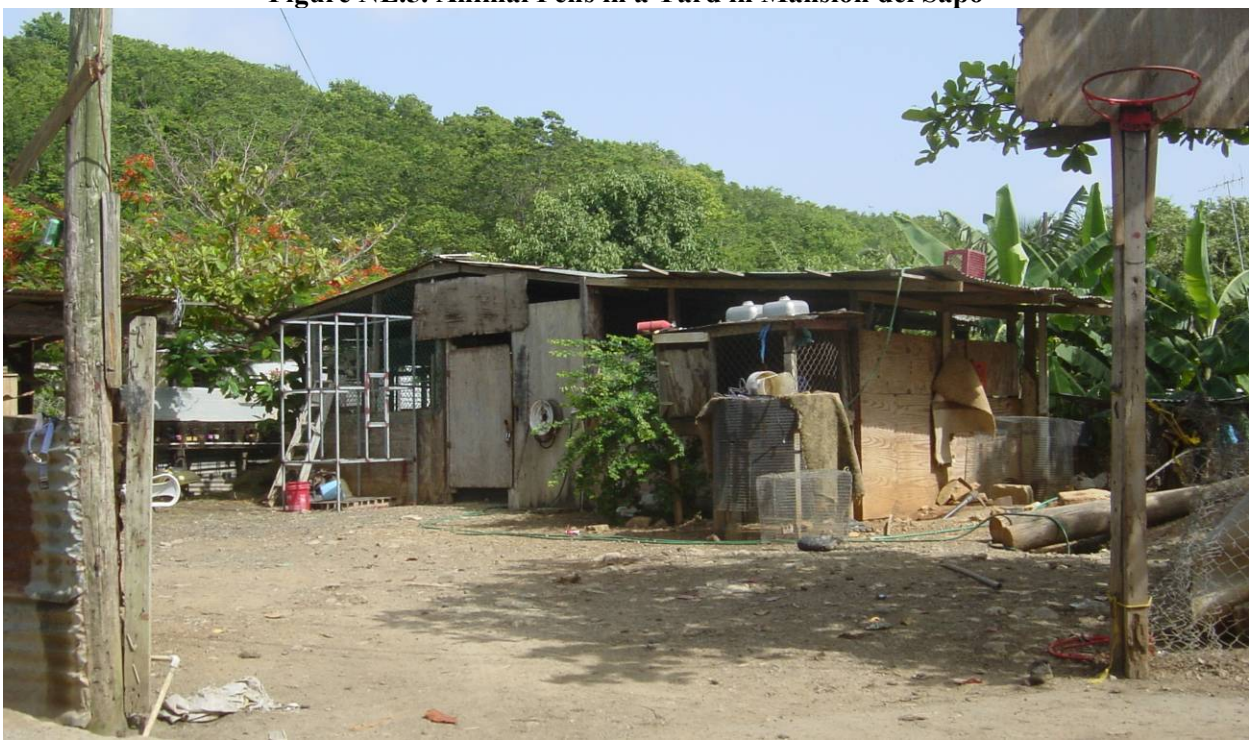
During most days, fishers gather at *Pescaderia Maternillo* and its nearby restaurants and bars. On weekends and after they have landed their catches on weekdays, their family members join them in folding chairs under palms lining the concrete walk along the harbor. During this time, as well, recreational and subsistence fishers use the *Pescaderia's* pier, indicating links between commercial fishing infrastructure and recreational fishing that are similar to those between recreational fishing and shipping infrastructure.

Figure NE.4. Maternillo Fishers Cleaning *Colirubia* (yellowtail snapper) across from *Pescaderia Maternillo* (note the recreational/ subsistence fishers using the association's pier in the background)

Further inside the community, following the Rio Fajardo, fishers and seafood consumers meet at two private fish markets: *El Relincho* and *La Recogida.* Strung out along the river are several vessels, natural ramps or other access points, private docks, and small and large houses with vessels and gear in their garages and yards. As one follows the road meandering along the river, moving inland from the harbor *Pescaderia Maternillo*, especially beyond a well known seafood restaurant called Rosa's, the houses and yards come to resemble poorer, peasant dwellings with attachments to agricultural and animal husbandry as well as fishing. This is *Mansion del Sapo*—Toad Mansion—a parcela that straddles livelihoods, its residents raising chickens and horses and engaging in subsistence and commercial fishing from the community's many access points.

Of the two neighborhoods, Maternillo is more explicitly engaged in commercial fishing. Its *Villa Pesquera* has 12 full-time and 12 part-time fishers. Three of the 12 full-time fishers are divers from the Dominican Republic. Fishers from both Maternillo and Mansion Del Sapo reported fishing for colirubia (yellowtail snapper) through the year, but also routinely catch kingfish, cojinua (blue runner), conch (which they believe is currently in decline), and baitfish (sardines, ballyhoo, etc.). Landings data from the two landing centers in the community, Puerto Real and Maternillo, confirm that yellowtail snapper is their most frequently caught species accounting for 28.2% of the catch over the 1983-2003 period. King mackerel account for another 13.4%. These were the only two species caught more than 10% of the time. Well over half (64.9%) of the fishers used bottom lines during this same time period, and 11.6% used SCUBA equipment. Most of their catch is sold locally, to the numerous seafood restaurants in the area and out of the three fish markets, but a small bus visits the community to buy their catch as well.

Figure NE.5. Animal Pens in a Yard in Mansion del Sapo



Annually, every June, the fishers from these neighborhoods gather to celebrate fishing, holding the *Festival de Pescado*, and in July they celebrate the Festival of the Virgen del Carmen, marching her statue through town and out on the water from the chapel where she resides through the year. Previously the seafood festival had been a three-day festival, supported in part by the municipality, but in 2005 the municipality withheld funds and the festival lasted only a day. This may reflect the municipality's backing of the marina expansion, which many commercial fishers oppose.

Las Croabas

The second fishing community in Fajardo, Las Croabas, sits out on a spit to the north and east of the central town of Fajardo. Two fishing associations, Sardinera and Villa Pesquera Atlantic Caribe, are important gathering and marketing centers for commercial fishers in Las Croabas; both are tied into the area's tourism in important ways. The associations share the community with a nature reserve, *Las Cabezas de San Juan (El Faro)* (The Heads of San Juan (the lighthouse)), a 316-acre park on the northeastern tip of Puerto Rico that the Conservation Trust of Puerto Rico acquired in 1975. The park is important to the fisheries of the region, and the island in general, for its research and educational efforts, some of which focus on the importance of mangroves and lagoons: "This community [mangrove forest and lagoons] plays an important role in the transitional zone between the land and sea," park officials write in their brochure. "Together, the mangrove forest and lagoons protect Puerto Rico's shores from natural disasters, create water purification filters and serve as both a refuge and nursery for wildlife, supporting over 40 species of fish and even more species of birds." The park is also important locally for directly preserving habitat within its walls, which support local fish populations.

Asociacion de Pescadores de Sardinera

Located on the main road between Fajardo's downtown harbor and Las Croabas, *Sardinera* has become a popular location for tourists and municipality residents to find fresh, high quality seafood, particularly on

the weekends. To the immediate north of the Association is the Sea Love Marina, and another, large complex (described in more detail below) is being built to their west. A fence separates their grounds from the neighboring marina, Sea Love, and they have, in turn, fenced in their own area. Fishers interviewed there reported that the Department of Agriculture has attempted to assume control of their facility, which is a prime coastal location, but that they have been able to maintain some autonomy with the backing of the local mayor of Fajardo.

The association has 17 members. Of these, three are Dominicans who dive, and seven to eight are bona fide fishers from Fajardo. The rest are from the greater San Juan metropolitan area—again testifying to the connections between Fajardo and the capital city. One of *Sardinera's* fishers still builds boats of fiberglass as well as of wood, indicating the presence of craftsmanship that not all fishing associations can boast.

Most of the fishers reported use lines, fishing around 13 nautical miles from Fajardo for colirubia, capitán (hogfish), grouper, and snapper. The Dominican divers leave port with, on average, six tanks apiece, targeting primarily high valued lobster and conch. Conch fishers complain that they aren't making as much money as they used to, in part because of the closed season for conch from July through September. This season, they claim, Peñalizes them while failing to adequately protect the conch, whose breeding season, according to fishers here, occurs in December.

Even without the seasonal closure, according to *Sardinera* fishers, expenses for catching conch and other species are rapidly catching up to sales figures. Divers claim that they leave port with the intention of catching at least 75 pounds of conch, which they can sell for $3.50/pound (or $262.50). However, to catch this amount they use up to six tanks of air, filled at a cost of $5.00 each ($30.00) and another $50.00 or more on gas for their boats and miscellaneous other expenses such as ice and maintenance. At the end of a long day they may have around $150 to $200. As with other seasonal occupations, such as farmwork in the United States, hourly wages under these conditions may seem high, ranging in this case from around $15.00 to $25.00/ hour, depending on the number of hours worked. Yet fluctuations in species abundance, weather, and human factors such as seasonal closures limit the amount of days per year that fishers can earn such hourly pay. Similarly, agricultural workers, working piece rates, can make what seem to be high hourly wages in fields thick with vegetables and fruit, yet field conditions vary from day to day and week to week through the year and their accumunated annual incomes can be quite low, usually below federal poverty levels (Griffith, et al. 1995).

Sardinera fishers cling to their hold over their association even as around them Fajardo continues to develop with ever greater recreational interests in mind. Despite new marina developments, they benefit from this traffic, selling three-fourths of their catch to local seafood restaurants and the other 25% to other parts of the island. Enhancing local seafood sales is the fact that the current association treasurer is a former head chef at a nearby seafood restaurant. Restaurants, many upscale and most featuring seafood, line the roadway to the north and south of the association, and the association itself sells cooked seafood to tourists and other visitors. They are tied into the community in other ways as well: consuming up to 110 bags of ice weekly, helping to support a local Gulf station with their fuel purchases, and having their tanks filled at a dive shop in Fajardo. Together with Atlantic Caribe, they endow Las Croabas with a commercial dimension to its attachment to the sea.

Atlantico Caribe

This association is larger than most, including *Sardinera*, with the typical lockers, an office, and pescadería yet also equipped with a large open-air, covered pavilion, a smaller (but still substantial) shaded sitting area with benches near the muelle, and a pier that is used not only for launching fishing excursions but also for ferrying bathers and snorklers out to Icacos island or any of the smaller islands off

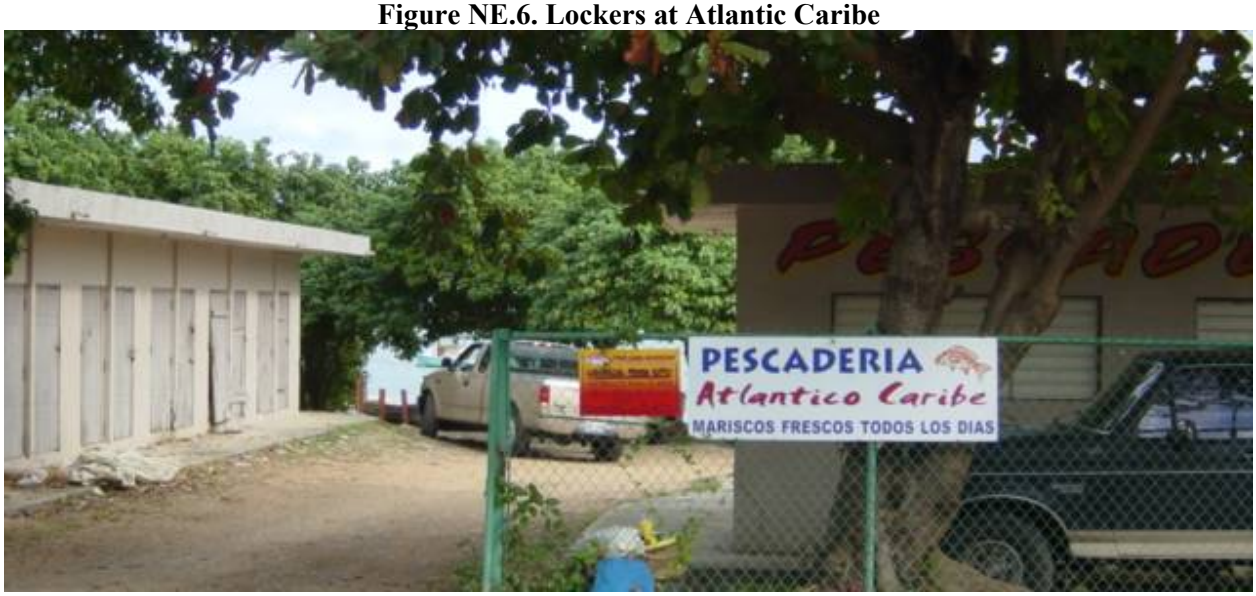
the coast of Fajardo. On weekend days, fishers from the association typically ferry between two and three family groups per hour; the families queue up at the shaded area described above, where they have the opportunity to interact with fishers. On each trip they can carry up to 15 individuals.

Forty fishers belong to the association, 25 of whom are bona fide fishers and 15 part-time. Two of these are divers, fishing with tanks and harpoons, and another 7 call themselves *naseros* (trap fishers). Formerly, they claim, there were up to 80 *naseros* at *Atlantico Caribe*. Currently they sell most of their catch directly to the public, adept at dealing with the public through their ferry services, yet when on the rare occasions that they have fish left over, they sell them to the restaurants in the area. There is one exception to this: *El Bohio,* a local family-owned and -operated restaurant, well known among visitors to Fajardo, purchase all the seafood they use in their restaurant directly from them. They claim that they sell only local catch, and that usually fresh instead of frozen, buying over 200 bags of ice per week to this end. A small portion of this ice they resell to tourists.

This association, like Maternillo, is an active gathering place for fishers, clearly central to their family life and their solidarity. Several old men seem ensconced in the place, and other fishers and ferry captains, all males, come and go, sharing their space happily with the tourists queuing up at the dock. Occasionally their children and grandchildren come by, lending credibility to the members' claim that the association is reproducing itself. Among their members we had the good luck to interview were two members of a family where the man has six sons, three of whom fish from this association. Another works in the United States, near New York. The sons are middle aged; the father can neither read nor write.

The family fishes with traps, fish and lobster both, with *cajones* and fish traps being the most important and *cordel*, for pelagic species, more or less second. Most other fishers in the association use lines, primarily, for species such as *colirubia, sierra, mero, sama,* and other deep water and pelagic species. They fish primarily in the waters north of Culebra to the waters north of Luquillo: an east west line along the edge of the shelf.

Figure NE.6. Lockers at Atlantic Caribe



Regarding the resource, fishers here reported viewing it worse than 10 years ago, yet better than 5 years ago: this was because of Hurricane Hugo, which tore through the area, destroyed reefs, and damaged mangrove forests. In addition to infrastructural damage, this made the fishing worse. Their economic situation, over all, is worse than it was five years ago, however. They practice their own conservation

methods in relation to reefs, careful to place their traps in the sand around reefs, rather than on the reefs themselves: this is in part due to the trap's efficacy: one of the gear changes they mentioned was to strengthen the bottom of lobster traps so that they lay flat on the bottom, which seems to improve their ability to catch. To do this they want flat, not rocky, bottoms, although they also want to take advantage of the reef's aggregating properties.

Fishers here, like fishers elsewhere, also mentioned the problems with pulling up fish from deep water—fish they aren't supposed to be catching—and finding them dead in the traps from the lack of pressure. This is wasteful and immoral to them, in part because they view the resource as something to be passed on to their family—their patrimony. The Jiménez (*pseudonym)* family, as three middle-aged brothers and a father, are indicative of the familial dimension of Villas Pesqueras: the older men gather at the Villa's space, playing dominoes and with their grandchildren, as well as exchange information about fishing and *las reglas.* In the Jiménez family, the father doesn't fish with the sons, but with *amistades* (friends), and then only one at a time, suggesting that the family overlaps with others from other families rather than keeps to itself.

Inside the Association grounds, while they share their space in the shaded area with tourists, there are clearly some places that are more or less "fisher space." The walk between the road and the muelle leads to a small patio-like area, shaded, where the tourists wait to be taken to Icacos and some of the fishers sit on short benches, talking and playing with the grandchildren, but the pavilion, the parking, the office, lockers, and other areas are clearly fisher spaces, more or less off limits to tourists. We witnessed one of the tourists, in fact, quite self-consciously violate this space, nervously, to ask about rides to Icacos: she stepped into the pavilion only briefly, because the fisherman waved her to the dock, where he said he would meet her in a moment.

Fishers' attitude to the state, here, as elsewhere, is ambivalent: on the one hand they appreciate working with groups like the Coast Guard Auxiliary, who give them safety training and provide them with licenses, and they have appealed to the state for resources (currently they are appealing to government agencies for funds to build a cement dock to replace their wooden one), but they have had major problems with DRNA enforcement personnel. They tell a story about this in pitched tones of voice, vehemently: how one of their sons was detained at sea the moment a woman on board began experiencing piercing pain in her side that she believed was appendicitis. The fisherman said that they could board his boat, but only after he reached the safety of the dock, where he could see to the woman's emergency. They were waiting for him at the dock, angry that he hadn't let them board him at sea, and again they detained him before he had a chance to help the woman to safety. A shouting match ensued, and slowly fishers from the association began converging on the DRNA vessel, coming to their fellow fisher's defense. The DRNA rangers then backed off. This show of solidarity, directed against the DRNA, underscores the mistrust fishers have for the DRNA, particularly for their enforcement personnel. Many times during the relating of this story they said that the DRNA personnel—one individual in particular—was *"anti-pescador."*

Summary

Fajardo's two commercial fishing communities—the downtown harbor and Las Croabas—are both tied into the municipality's tourist trade through not only seafood sales but through other ways of taking advantage of the boating and foot traffic through the area. Yet seafood restaurants comprise a central part of the Fajardo tourism experience, and the associations and private fish markets of the two communities continue to provide diners a range of high quality, fresh seafood. The tables below, from the Puerto Rican census of fishers, show that of the 50 fishers responding to the census (between 60% and 70% of the total reported to us in Fajardo), reef and continental shelf fishing account for most of the fishing effort. This is in line with the species listed as most important: conch and lobster, which tend to

be captured along the shelf, and the snapper-grouper species that are captured from reefs—*colirubia* in particular, which many fishers stated was their most important species, available all year. A majority (70%) also reported fishing for pelagics, primarily *sierra* (king mackerel).

Table NE.2. Fishing Locations and Styles, Fajardo (n=50)

Fishing Location	Percent Reporting
Continental Shelf	96
Oceanic	32
Reef	94
Shore	6
Shelf Edge	20

Source: Puerto Rican Census of Fishers, 2002
Totals do not add up to 100% because fishers typically fish multiple locations

Fajardo fishers reporting in the census were primarily affiliated to associations; our ethnographic work supports this in the downtown harbor area as well as in Las Croabas, yet in Masion de Sopa many fishers sell to private fish dealers without any affiliation to an association. Nearly half are full time fishers, fishing at least 40 hours a week, and the average of 30.52 hours suggests that most spend a good portion of their week fishing, with only 2% reporting fewer than 20 hours (an additional 28% didn't report hours).

Table NE.3. Selected Fajardo Fisher Characteristics

Variable	Response
Association Member	84%
Hours used for Fishing	
< 20 hours	2%
20 – 30 hours	18%
31 – 39 hours	4%
40 hours	32%
> 40 hours	16%
Mean hours	30.52
Standard Deviation	12.911
Minimum hours	0
Maximum hours	06

Source: Puerto Rican Census of Fishers, 2002

Table NE.4. Gear Used by Fajardo Fishers

Gear	Percent Using
Hand Lines	86
Snapper reel	14
Long line	12
Rod & Reel	36
Troll line	54
Beach Seine	8
Gill Net	30
Fish trap	26
Spear	22
SCUBA/ diving	6
Trammel Net	2
Lobster trap	2

Source: Puerto Rican Census of Fishers, 2002

The gear listed in the table above also conforms to our ethnographic interviews and observations. Despite that 30% use gill nets (likely for bait), this is clearly not primarily a net-based fishery, most likely due to the sheer numbers of recreational and other boats in the water, which would interfere with navigation and result in net loss. Instead, most commonly, fishers here use lines first, and other gears second, including traps and diving equipment.

Table NE.5. Marketing Behaviors of Fajardo Fishers

Marketing Behaviors	Percent Reporting
Fish dealer/ buyer	26
Association	58
Street vending	8
None	8
Sell fish gutted	16
Keep fish on ice	90

Source: Puerto Rican Census of Fishers, 2002

Table NE.6. Opinions of Fajardo Fishers Regarding Fishery Resources

Opinion	Percent reporting
Status of Fishery Resources	
Better	2
The same	37
Worse	61
Reasons for problems in fisheries	
Pollution	28
Habitat Destruction	14
Overfishing	12
Laws, regulations, and licensing	0
Crowding	10
Seasonal factors	2

Source: Puerto Rican Census of Fishers, 2002

Not surprisingly, one in ten fishers in Fajardo listed crowding as one of the principal problems facing the fishery. Again, the large number of vessels using the marinas of Fajardo and neighboring Ceiba, as well as visiting traffic from other Caribbean islands through these passages where the Greater Antilles and Lesser Antilles meet, make crowding a constant factor in fishing from the eastern shore. Because of this, marinas in Fajardo demand some special attention.

Marinas and Marina Development in Fajardo

Marinas currently occupy much of Farjardo's coast and are critical to the local economy and future growth trajectories. Most of the eleven marinas currently in the area have plans for expansion, and a new marina is well underway, much of it expected to be finished in the coming year or two. Marina development is likely to impact Fajardo commercial, subsistence, and recreational fishers in some fashion, if only because, currently, marina development is one of the primary economic activities taking place in Fajardo. For this reason, we visited other marinas to assess their role in the region's fisheries. As with Puerto Real, the number of fishers, either recreational or commercial, utilizing the marinas of the area, is very low compared to those using the marinas for recreational boating.

Marina Puerto Chico

One of Fajardo's established marinas, Puerto Chico has been in existence since 1966, or nearly four decades, and over that time has grown to include slip space for 266 vessels and dry stack space for 370 more, thus serving 636 boat owners. The vast majority of the vessels stored here are from San Juan, again testifying to this region's close ties to the metropolitan area. Similar to Puerto Real's marina, few commercial or recreational fishers use Puerto Chico as their base, although one of its 27 employees is a commercial fisher who sells his catch to the association at Maternillo. Of those who use the marina, the director knew of only six (or < 1%) who were directly involved in fishing: four recreational and two commercial. Two of the recreational fishers also routinely fish in fishing tournaments, and the commercial fishers sell their fish to restaurants in San Juan.

Like other marinas, Puerto Chico provides a number of services to the community that both boating and fishing traffic can take advantage of, selling ice and fuel, maintaining a freezer for fish storage, and keeping a boat mechanic on hand for minor repairs. The marina's ties to the fishing industry cannot be said to be strong, however, and the boating traffic they encourage is likely more damaging to the region's marine resources than beneficial.

Nevertheless, marina development continues in Fajardo. Currently, in Las Croabas, there are at least two elaborate marina-condominium complexes being built, both advertising upscale accommodations with prices far beyond the reach of most Puerto Rican families. Indeed, as the photo of the billboard below shows, advertisements for these developments are less likely to depict Puerto Rican than whites from the U.S. mainland. That this particular advertisement is written in English is further evidence that they are attempting to attract families from outside the area.

Figure NE.7. Advertisement for New Condominium Complex in Fajardo

Fajardo's economic dependence on marinas may overshadow the contributions that fishers make to the local economy and society, yet Fajardo's two robust fishing communities—both fishery-dependent communities—combined with the popularity of the municipality's seafood to residents of the San Juan metropolitan area, make fishers' attachments to the sea a central part of the Fajardo experience. Without continued work on the part of fishers from Las Croabas and Downtown Harbor, the quality of the visitor's experience in Fajardo would suffer and the alternatives available to him or her for transportation, good food, and the general ambiance that fishing vessels and association facilities lend coastal landscapes would diminish. In addition, the continued vigilance with which fishers observe the near-shore natural

environment, objecting to ecologically destructive dimensions of marina and other coastal development, add voices and perspectives to processes that, though they seem inevitable, need not be.

Ceiba

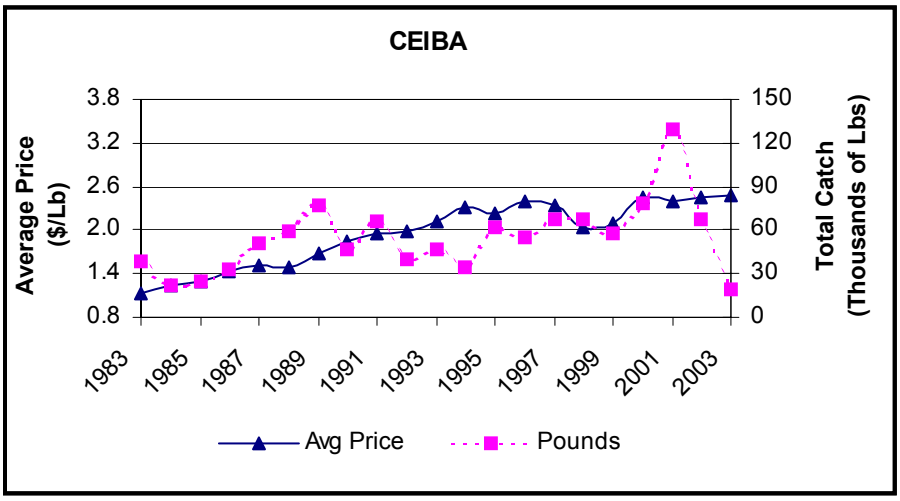
Roosevelt Roads, a U.S. military base, dominates much of Ceiba's coastline and has, very likely, contributed to the relatively low (if rising) unemployment rate that Ceiba enjoyed from 1950 to 1970. In addition to lower rates of unemployment, the percentage of people below the poverty level is also lower in Ceiba than in most of the coastal municipalities.

Table NE.7. Ceiba Census Data

CEIBA	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	9,199	9,075	10,312	14,944	17,145	18,004
Civilian Labor Force (CLF) [2]	1,926	1,808	2,157	3,288	5,090	5,084
CLF - Employed	1,847	1,672	2,046	2,817	4,150	4,151
CLF - Unemployed	79	136	111	471	940	933
Percent of unemployed persons	4.10	7.52	5.15	14.32	18.47	18.35
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		584	126	43	55	22
Construction		192	327	206	449	367
Manufacturing		52	273	592	631	317
Retail trade		156	278	378	756	576
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	18.3	15.7	18.1
Persons who work in area of residence [6]		2,704	2,152	3,204	4,576	3,386
Per capita Income (dollars) [7]			1,233	2,817	5,119	9,256
Median Household Income (dollars) [8]		1,702	3,203	6,983	11,817	16,440
Individuals below poverty level [9]			5,330	7,243	7,353	6,479
Percent of Individuals below poverty level			51.69	48.47	42.89	35.99

Ceiba's landings place it 16th among the 41 reporting municipalities, in line with municipalities, such as Mayagüez, where fishing plays an important symbolic role in the local setting. Experiencing a gradual rise, in both landings and price, through the 1990s, fishers seem to have witnessed a series of declines early in the 21st century, with pounds landed dropping from a high of over 120,000 to a low of under 30,000. Prices have risen, more or less steadily, over the 20 years reported here, regardless of supply, except during the mid-1990s (correlation coefficient = .4363).

Figure NE.8. Ceiba Landings Data, 1983-2003



Ceiba History

Like Fajardo, Ceiba was populated slowly, through fits and starts, suffering particularly devastating crises during the 1850s. A cholera epidemic, virulent in Ceiba during 1855 and 1856, was followed a year later by Hurricane San Ciriaco, leading Fajardo to annex the territory. Fajardo's control of Ceiba lasted until 1914, when the territory reverted to its original autonomous status.

Their autonomy lasted fewer than three decades. During the Second World War, Ceiba again lost control of territory. In 1942, the federal government appropriated a large stretch of land, much of it coastal, to construct a naval base. The base transformed the municipality's economy. Prior to the war, Ceiba's inland region was agricultural, known especially for animal husbandry. What little sugar was produced in Ceiba found its way to the mills of Fajardo. Along the coast, animal husbandry was "complemented by fishing" (*"se complementaba con la pesca en los pueblos costeros"* —Toro Sugrañes 1995: 110)—a phrase implying it remained somewhat marginal to coastal livelihoods. "Ceiba faces fishing grounds that are counted among the best in Puerto Rico, but very special political conditions haven't permited the development of this industry to its full potential" (*"Ceiba está frente al mejor espacio pesquero con que cuenta Puerto Rico, pero las muy especiales condiciones políticas no han permitido el desarrollo de esta industria en toda su potencialidad"*—ibid.).

While Toro Sugrañes views the development of the Marina del Rey—one of the largest in the Caribbean, with the benefit of the close proximity of Fajardo's marine traffic—as one of the most significant marine related developments along the coast, interviews and a focus group with fishers at Ceiba's *Villa Pesquera Los Machos* revealed that his views are not shared among Ceiba's fishing families.[5] They complained that the development of the marina significantly increased contamination and decreased water quality.

Los Machos

The military base Roosevelt Road, currently being closed, takes up much of the coastline of Ceiba, Fajardo's neighbor to the south, but just north of the base, beyond the massive marine and boat yard complex of Puerto del Rey, a nice road curves east to the sea and the facilities of the *Asociación de*

[5] Puerto del Rey, according to Fajardo official sources, is in Fajardo, yet it is near enough to the fishing association in Ceiba that it infringed on their fishing lifestyles.

Pescadores de Playa los Machos. A public beach neighbors the association to the south, where there are small wood and corrugated zinc shelters and a large parking lot.

Figure NE. 9. Sign at Entrance of Ceiba *Villa Pesquera*

The association sits facing a peaceful bay that is bordered on the north, inside the military base, by healthy-looking mangrove forest and on the south by a long, cement, public pier that people use for recreational fishing. Recreational fishers fish too from the shore near the association, with rods and reels as well as hand lines. Frigate birds join the recreational and commercial fishers in their fishing, diving along the shore and in the bay among the fishing vessels.

During our first visit to *Los Machos*, in March, 2005, fishers we interviewed mentioned that they were working to open the restaurant within three or four weeks, hoping to attract some of the trade from the beach and possibly the military base. During our second visit, in June, the restaurant was indeed open, with steady business from the proximity of the beach and the popularity of the area for fishing. *Villas Pesqueras* with seafood restaurants, as noted in elsewhere in this work, generally convey a different image of the fishing community than those that are merely locations where fishers gather and launch their forays at sea. Perhaps most importantly, the presence of a restaurant often means that more women and family members are working on the premises, becoming a critical part of the enterprise. The association in Ceiba is no exception to this, presenting itself as well organized, with a woman secretary who is married to one of the members and who manages the restaurant. Much of the association's organization may be attributed to her. The signs posted on the walls, neatly (see below), are due to her efforts.

Women often lend an important dimension to fishery politics. In North Carolina, for example, women became important activists/ advocates in the state's marine fisheries, drawing on shore-based networks that were often based on common affiliations with school systems (some as teachers, others as parents), churches, and jobs in local government (Griffith 1999). Women were instrumental in organizing a concerted response to new fishery regulations in the Northeast groundfishing industry as well (Griffith and Dyer 1996). In these and other settings, women often link, very publicly, threats of economic declines due to regulatory changes to crises in patterns of consumption within households, endowing their protest with a familial quality that often assumes a moral character (Nash 1994). Griffith and Valdés

Pizzini (2002: 164-65) documented one instance where a woman's determination enabled her husband to use fishing to resist the authority of sugar company *mayordomos,* or foremen, who were treating the sugar workers poorly.

The women at *Los Machos* may be similarly important political resources. During our second visit, the secretary lined up several men to interview, apparently having some influence over them. She was considerably more verbose and animated than most of the men, although her presence in the focus group stirred up both the young and old men, who agreed with her opinions completely. She handles much of the association's finances, manages the restaurant, and keeps activity orderly within the *pescaderia* and fish cleaning rooms of the association. Some of this is aided by signage, one of which reads:

Figure NE.10. Sign Reading, "The fish processing area remains restricted only to members working and donating hours. Others should keep out of this area."

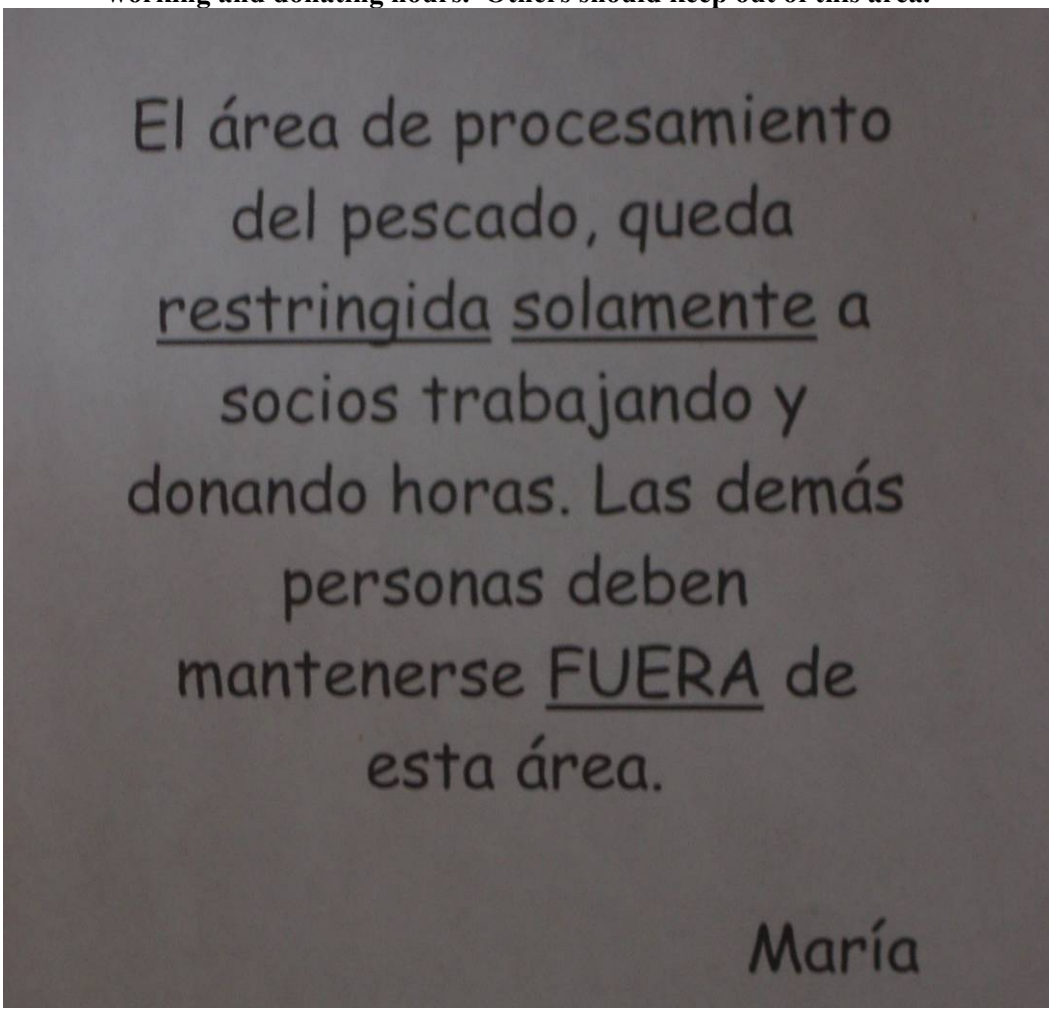
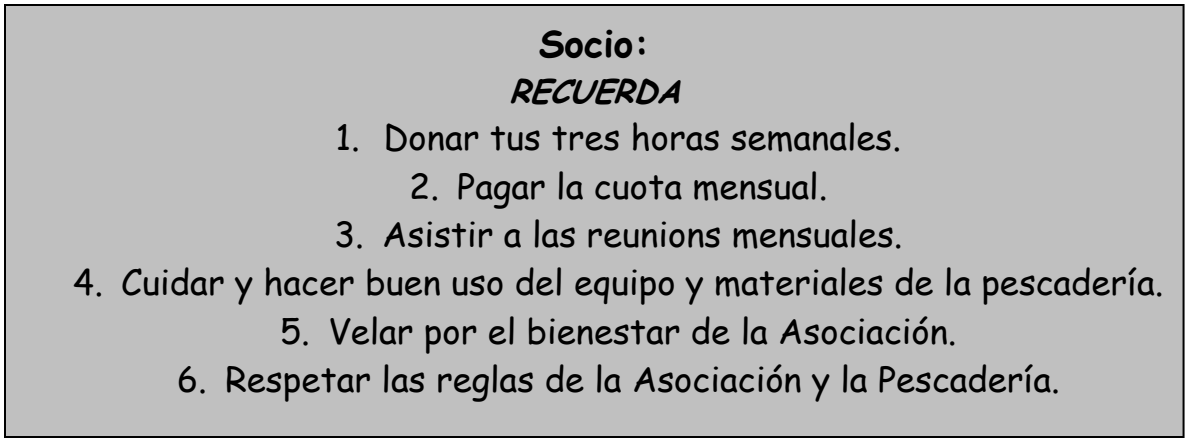


Figure NE.11. Sign Reading, "Member: Remember: 1) donate 3 hours per week; 2) pay monthly dues; 3) help with monthly meetings; 4) take good care of the equipment and materials in the fish market; 5) watch over the well-being of the Association; 6) respect the rules of the Association and the fish market."



Our interviews with fishers at *Los Machos* revealed a vibrant fishing community that is actively reproducing itself through family ties. One fisher who participated in the focus group, 19 years of age, mentioned that his father had taught him the craft of fishing and that, now, he was teaching his young son. He added that he considered fishing a family heritage, and the others at the agreed. While they do hire non-family members from the community from time to time, their most reliable crew come from their families; they find that crew hired from the community at large are usually interested in target earning (earning a specific sum and then quitting until they need another sum). In all, we interviewed seven fishers and one fisher's wife at *Los Machos*. The census indicates that 80% of fishers in Ceiba are members of its association, although the census failed to capture all of Ceiba's active fishers.

Table NE.8. Selected Fisher Characteristics, Ceiba (n=15)

Variable	Response
Association Member	80%
Hours used for Fishing	
< 20 hours	46.7
20 – 30 hours	26.6
31 – 39 hours	6.7
40 hours	20
> 40 hours	0
Mean hours	23.87
Standard Deviation	11.044
Minimum hours	8
Maximum hours	40

Source: Puerto Rican Census of Fishers, 2002.

According to our interviews, currently there are 16 bona fide members in the fishery and another 10 to 12 (total 26-28) who fish part-time; even the part-time fishers, however, must comply with the above rules to use the facilities. Fishers reported using a variety of gear, including fish and lobster traps, lines, diving equipment, and trammel nets, shifting in gear use through the year according to the availability of species, ideas regarding resource health, and regulations (such as the seasonal closure, beginning July 1, for conch). They build, repair, and maintain boats on the association grounds and

build their own traps, although the trammel nets they have made for them, providing specialists from outside the community with cord they purchase at Wal-Mart. They rely on Puerto Del Rey to fill their air tanks, taking 6 per trip, as well as a marina in Culebra. Culebra's prices are somewhat higher, however, for air as well as gas. When they know they are going to fish near Culebra, they usually take extra tanks of gas because fuel prices are high there. The following table shows that, in fact, use of traps is high in Ceiba, and that somewhere between one-third and one-half of fishers there dive.

Table NE. 9. Gear Used by Ceiba Fishers (n=15)

Gear	Percent Using
Hand Lines	73.3
Snapper reel	13.3
Long line	0
Rod & Reel	20
Troll line	26.7
Beach Seine	0
Gill Net	40
Fish trap	80
Spear	53.4
SCUBA/ diving	33.3
Trammel Net	6.7
Lobster trap	73.3

Source: Puerto Rican Census of Fishers, 2002.

Knowledge of substrates is critical to their fishing strategies and to their assessments regarding the health of marine resources of the area. Like fishers from Fajardo, they fish a triangular area that extends from the western tip of Vieques to the western tip of Cuebra and to Las Croabas, Fajardo, making sure they avoid the Luis Peña marine reserve near Culebra. This area includes the waters near Vieques, Palomino Island, Fajardo, Culebra, Cayo Norte, La Cordillera (Lobo, Lobito, etc.), and La Cordillera de la base. They shift from place to place over this broad area in the same way, they said, that farmers move from field to field, letting some lie fallow, so the resource can recover. The two main substrates they exploit are grass beds, where they dive for lobster and conch, and coral reefs, where they fish for many of the same species that Fajardo fishers target, such as the snapper-grouper species. They also target pelagics such as dorado and sierra. Divers here report that the substrates are generally in good condition, although occasionally there are contamination incidents and sedimentation whose source is a mystery to them. These incidents tend to negatively impact the conch population. The following table confirms the importance of reefs and the shelf in Ceiba fishing behaviors.

Table NE.10. Fishing Locations and Styles, Ceiba (n=15)

Fishing Location	Percent Reporting
Continental Shelf	93.3
Oceanic	46.7
Reef	93.3
Shore	0
Shelf Edge	0

Source: Puerto Rican Census of Fishers, 2002.
Totals do not add up to 100% because fishers typically fish multiple locations

They fish for conch in different locations depending on the moon, finding them closer to shore during a new moon and in deeper water during a waning moon. They also wait for changes in subsurface currents

to move sand enough to see the conch. The disposal of conch shells is something whose significance is debated among fishers. Some believe that piles of conch shells repel conch, creating the image of a conch cemetery, while others believe that piles of conch shells attract live conch. Fishers in *Los Machos* believe that whether conch shells repel or attract conch depend on where you dispose of them: if you dispose of them on coral reefs, they will attract more conch, but if you dispose of them in grass beds it creates the conch cemetery image. The impact of this on reefs is an issue for others to decide, although, as just noted, divers here reported that the reefs in their fishing territory are in good condition. They also reported recognizing that coral reefs are important to the health of the fisheries, and so limit their interactions with them.

They reported selling about half their catch to the association, much of it for use in its restaurant, and sell the other half through various channels, including one client from as far away as Santa Isabel (on the south coast), whom they have been selling conch for over eight years. The table below indicates that, for those reporting to the census, the association is the primary marketing outlet. They also reported that fish was an important part of their diets and the diets of their neighbors, with whom they often shared fish they couldn't sell and weren't going to eat themselves. This sharing is reflected below, in their attitudes toward wasting fish under current DRNA regulations.

Table NE.11. Marketing Behaviors of Ceiba Fishers (n=15)

Marketing Behaviors	Percent Reporting
Fish dealer/ buyer	6.7
Association	86.7
Street vending	6.7
None	20
Sell fish gutted	0
Keep fish on ice	86.7

Source: Puerto Rican Census of Fishers, 2002

The extensive knowledge base of fishers in Ceiba, as with professional fishers across the islands, qualifies them to critique current regulatory initiatives, as well as the behaviors and activities of regulatory agencies. Everyone we interviewed here agreed that the DRNA is their principal problem, repeating complaints that are common among fishers everywhere in Puerto Rico:

1. Licenses and permits have become overwhelming and costly, with too many species-specific licenses. Fishers here added that some of the elderly fishers of the association, who had been fishing for more than 50 years, were sometimes issued "beginners" licenses because they didn't have proper tax documents. They said that having this designation on their license was very humiliating for some.
2. When you pull up fish from the deep, they are already dead. Interestingly, however, one of the fishers at the focus group said that, many years ago, they used to deflate the bladder of the fish with a needle, so that they would quickly sink back to the bottom and revive. Now they waste so many of the fish that they no longer practice this. You can't help killing these deep-water species. This wasteful practice is immoral to them, and one of them suggested that at least they should be able to give the dead fish to the elderly.
3. The DRNA officials have little to no experience on the water; whoever is developing and enforcing the regulations should come learn from those who are on the water *"dia por dia."*
4. Licenses for such things as dredging and coastal development are given out unfairly, more often to large developers like the contractors building and maintaining Puerto Del Rey than to small organizations like *Villas Pesqueras*. Fishers here were denied a dredging permit even after Puerto Del Rey was granted the same type of permit to dredge where manatees visited every year.

Despite Ceiba fishers' problems with wasteful regulations and the DRNA, those interviewed in the census were more likely than not to view the fisheries as the same as previously; most of those we interviewed during our ethnographic phase, however, agreed with the 40% who said that the resource was worse off today than previously. It is interesting that no Ceiba fishers listed habitat destruction as among the problems threatening fisheries, perhaps because the military's presence kept coastal development in check.

Table NE.12. Opinions of Fishery Resources, Ceiba (n=15)

Opinion	Percent reporting
Status of Fishery Resources	
Better	0
The same	60
Worse	40
Reasons for problems in fisheries	
Pollution	6.7
Habitat Destruction	0
Overfishing	20
Laws, regulations, and licensing	0
Crowding	0
Seasonal factors	0

Source: Puerto Rican Census of Fishing, 2002

Summary

Despite their virulent opposition to DRNA, members of Las Machos fishing association are perhaps buffered from the effects of MPAs and other regulations by their traditional practice of moving among fisheries and fishing territories in the way a farmer moves among crops and fields, letting some lands lie fallow while working others. This has preadapted them to responding to seasonal and area closures, yet has also exposed them to a variety of fishing territories and, hence, has given them extensive knowledge of the region between Puerto Rico's east coast and a line extending from the western tip of Vieques to the marine sanctuary at Culebra. From this knowledge, they continue to criticize, while abiding by, current fishery regulations.

Vieques

For several weeks during the last months of the 20th century, Vieques achieved more attention than any other place in Puerto Rico, the *viequenses* (people of Vieques) entering the homes of their fellow U.S. citizens through televisions and radios as they protested the U.S. Navy's use of the island's marine and terrestrial territory for bombing practice. The protest began following the accidental bombing death of a civilian guard, but its broad support among Puerto Ricans living at home and abroad drew from a deep well of resentment toward the Navy. Naval commanders ruled Puerto Rico during the initial years of U.S. occupation, and together with the appropriation of Puerto Rican territory for military installations in Ceiba, Vieques, and elsewhere, its disproportionate use of Puerto Ricans in military campaigns around the world, military violations of Puerto Rican sovereignty have left many Puerto Ricans feeling as though they have been abused by power in one of its most raw forms.

For viequense fishers, this has been an especially disruptive experience. Annually, the waters, substrates, mangroves, reefs, sea grass beds, and other marine and littoral environments have been bombed, at times with fishers' vessels and gear. Resentment and resistance among viequenses, long a common form of interaction, has predisposed them toward suspicion of the state and its representatives, whether arriving in naval uniforms or carrying landing sheets and other tools of reporting. Indeed, within our first five minutes of fieldwork in Vieques, we were called "*camarones*"—the slang term for undercover police in Puerto Rico.

Recent history in Vieques makes the typical ethnographic challenge of establishing rapport all the more difficult. Luckily, however, the attention Vieques has received in recent years has resulted in several scholarly and popular works that enhance our limited ethnographic observations and interviews. Most important among these is the work, Vieques en mi Memoria: testimonios de vida, by Ana M. Fabián Maldonado,[6] a work eliciting life histories from 15 viequenses, most of whom, like most native viequenses, are in way or another attached to the marine resources surrounding the island.

Despite military claims that they have added to Vieques's economy, census data suggest otherwise. Its high levels of unemployment and poverty compare unfavorably to those in most other coastal municipalities. Again, all sectors displayed below, except construction, have been experiencing losses of jobs.

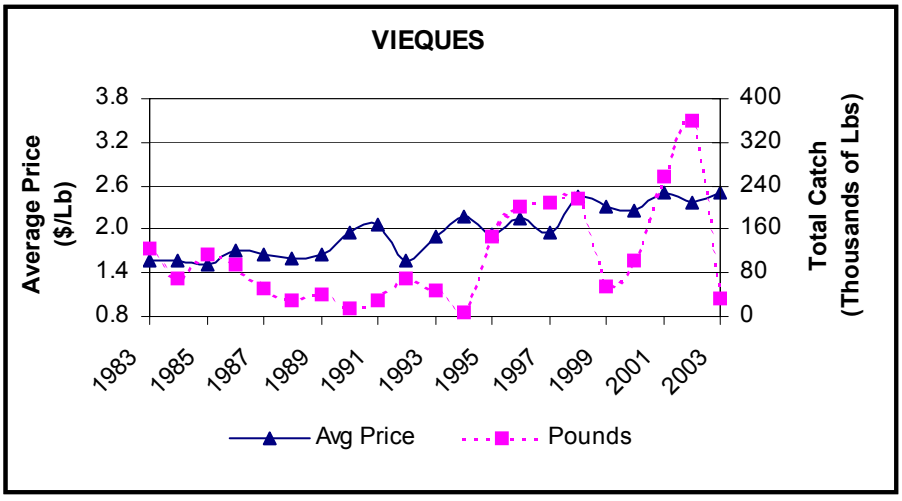
[6] This text has been useful here for its detailed chronology of Vieques history as well as for its in-depth look into the lives and families of Vieques residents.

Table NE.13. Vieques Census Figures

VIEQUES	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	9,228	7,210	7,767	7,662	8,602	9,106
Civilian Labor Force (CLF) [2]	2,163	1,820	1,812	1,793	2,620	2,386
CLF - Employed	2,118	1,776	1,658	1,371	1,932	1,712
CLF – Unemployed	45	44	154	422	688	674
Percent of unemployed persons	2.08	2.42	8.50	23.54	26.26	28.25
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		752	121	33	51	29
Construction		164	168	129	175	249
Manufacturing		124	497	278	227	117
Retail trade		220	205	124	364	172
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	15.1	13.5	17.0
Persons who work in area of residence [6]		1,688	1,667	1,307	2,032	1,626
Per capita Income (dollars) [7]			812	1,480	2,997	6,562
Median Household Income (dollars) [8]		792	1,855	3,143	5,864	9,331
Individuals below poverty level [9]			5,356	6,030	6,192	5,880
Percent of Individuals below poverty level			68.96	78.70	71.98	64.57

In this economic climate, fishing provides a cushion against unemployment while also endangering the viability of fishing as a full-time lifestyle. Full-time Vieques fishers—those who have dedicated their lives to fishing—complain that part-time fishers flock to the sea with upswings in unemployment. Landings data from Vieques reflect heavy use of the resource, by both part-time and full time fishers. Of all coastal municipalities reporting landings, Vieques ranks third.

Figure NE.12. Vieques Landings Data, 1983-2003



Fairly stable through the 1980s, landings from Vieques rose during the 1990s and then again, after a drop from 1999 to 2000, in the early 21st century. The decline from over 320,000 pounds to around 40,000

pounds from 2002 to 2003, seen all around Puerto Rico, may be more of a reporting error than an actual decline in landings.

Vieques History

The largest of two island municipalities, Vieques shares with several other Caribbean islands the mixed honor of being among the first islands that Columbus, in 1493, encountered. The Spanish crown, through communiqués from Pope Alejandro VI, claimed Vieques as its territory four years later. At that time, Taino caciques occupied leadership positions on the island, organizing the Native American population into a ranked society dependent on a mixed economy of agriculture, fishing, and hunting. The Spaniards left this system more or less alone, operating under its own administration, for nearly four decades. In 1514, this autonomy changed when two caciques, Cacimar and Yaureibo, attacked the main island's east coast (likely Fajardo), initially forcing the flight toward San Juan of several colonists. Retaliation, however, was swift and ultimately more comprehensive, leading to the establishment of a Spanish foothold in the typical form of a church.

The island's strategic position in the sea lanes—midpoint between the Greater and Lesser Antilles—made Vieques a prized and contested possession, one the Spaniards lost control of to the English in 1647, only to retake control later that same year. Forty years later, the French took control of Vieques for a decade, losing it to Spain in 1697. Such transfers of power continued through the 18th century and into the 19th, with pockets of English and French living on the island and the Spanish consolidation of its political power and economic control uneven and incomplete. As a symbol of its turbulent history, viequenses still relate that, for five days in August of 1816, the American liberator-general, Simón Bolivar, found sanctuary on Vieques, retreating from defeat along the Venezuelan coast. Not until a third of the way into the 19th century, in 1832, did the political and economic situation in Vieques begin to stabilize.

Over the next ten years, until the early 1840s, the fist sugar haciendas and mills were established, laying the foundation for subsequent economic development based on export agriculture and the subordination of rural people to the rhythms of sugar and other agricultural commodities. Griffith and Valdés Pizzini profile Vieques fishers who, over a century later, struggled to free themselves from this subordination through fishing:

> "In 1955, Santos 'became independent from sugarcane' when he bought a small boat, a motor, and fifteen traps. He founded a fledgling fishing operation that, with the help of members of his household, enabled him to gain at least temporary independence. Santos was not alone. Another Vieques fisher named Victor became disengaged from sugarcane production through a similar route" (2002: 165).

The desire to get out from under the authority of *mayordomos* and the sugar industry in general may have been responsible for Vieques's reputation as link in contraband trade routes in the Caribbean. This dimension of Vieques history, similar to many other coastal locations, continues to present those with seafaring skills, such as fishers, opportunities to engage in drug trafficking and other illegal activities, an option that both enhances and in enhanced by the adversarial stance of many viequenses toward the state.

Against a background of smuggling and other illegal activities, Spanish authorities continued to take steps to assume control over the viequenses. Among the peaceful methods of control was the expansion and deepening of moral authority through the construction of the Catholic *Iglesia Parroquial de Vieques*, in 1855, and, in 1870, the first Episcopal Church. Military and legal authority accompanied attempts of enforce conformity through religion, with the quelling of worker protests and, in 1871, the regulation of

peonage, requiring all peons to live on the haciendas where they worked as well as to show obedience to *hacendados* and the authorities.

Three years later these draconian measures led to an uprising at the hacienda Playa Grande, in which many workers were wounded and one was killed. The governor of Vieques, Juan Luján, ordered those who participated in the uprising imprisoned in the Fort Conde de Marisol. The tense stability these measures secured was shattered in 1898, when the United States took the island and, in 1903, established an observatory at the same fort where Luján incarcerated the rebels.

These developments set the stage for drawing Vieques into expanding U.S. hegemony, with its naval power at the helm, ushering in a new era of expanded sugar production, labor unrest, and immigration to the island. Strikes in the sugar cane fields and mills occurred in 1915 and again in 1920. The former succeeded in reducing the workday by six hours, from 14 to 8 hours, and increasing wages. The latter succeeded in improving conditions as well, yet was stimulated by increased immigration of sugar workers, many from Louisiana, to Puerto Rico, where viequenses accused them of taking jobs from Puerto Ricans. As through much of the Caribbean, strikes in particular and labor unrest in general often coalesced political leadership and party development, and this occurred in Vieques coincidentally with increased U.S. military interest in the island. In 1924, as the local branch of the *Partido Nacional* was beginning to organize, the first military maneuvers were conducted off the coasts of Vieques and Culebra, and two years later the military expressed an interest in building naval bases on Vieques; the *Partido Nacional* held its first meeting four years later.

Over the next two decades, the military presence spread in Vieques, culminating, in 1940, when the Navy began expropriating lands for military purposes, eventually assuming control of all but the central 4,640 acres, where the two principal cities—Isabel Segundo and Esperanza—are located, the former on the north coast and the latter on the south. Construction of the base caused yet another wave of immigration into Vieques, tightening the social connections between the Virgin Islands and Vieques to the east and Ceiba/Fajardo and Vieques to the west. Construction of Roosevelt Roads base, in Ceiba, began around the same time. These developments also resulted in increased passenger ferry traffic across the region, an economic development still important to Vieques today. Passenger ferries between Fajardo's downtown harbor and Isabel Segundo arrive in and depart from Vieques several times a day. Mid-century Vieques also witnessed the growth of cattle ranching and expansion of agricultural production away from a concentration on sugar, including the development of pineapple plantations.

Despite the work and development that the construction of the military bases stimulated or enhanced, relations between the military and native viequenses were strained from the beginning. Following World War II, problems erupted every few years. In 1947, for example, an organization called the *Hijos de Vieques* (Children of Vieques) publicly opposed the military presence after succeeding in moving the government of Puerto Rico to establish a rum distillery on the island. Similar protests occurred in 1948. Through the 1950s, fights and related violence broke out periodically between native viequenses and military personnel, including a riot in 1959 at the Recreational Social Club of Vieques, resulting in several injured. In 1961, viequenses protested the storage of nuclear weapons on their soil. In response to this, Robert McNamara proposed clearing the island completes of viequenses, including in his proposal a plan to relocate bodies from cemeteries, to avoid people returning to the island to visit the dead.

Such proposals, hotly contested, were indicative of the lack of sensitivity on the part of U.S. administration after U.S. administration toward the viequenses' desires to take control of their island. Continuing through the remainder of the 20th century, stained with the occasional riot, murder, or accidental death, they eventually led to the occupation of the base in 1999. Importantly, the commercial fishers of Vieques were at the forefront of these struggles, suing the U.S. government in 1979 in an attempt to force the navy to curtail their maneuvers and their shelling and actively backing the various

protests against the military. Prominent fishers were named as plaintiffs in such cases as well as occupied positions on the special commission that convened in 1999 to resolve the crisis of the occupation.

Fishing in Vieques

> *"Pesca no es sobre vivir, es sobre sobrevivir."* ("Fishing isn't about living, it's about surviving"). —Vieques fisher, June, 2005

Ironically, given their adversarial relation to the federal government, Vieques fishers' relationships with local branches of the state, especially the Department of Agriculture and its extension office on the island, have been at once beneficial and a source of division within the fisheries. Geographically, Vieques is positioned with its length oriented in an east-west direction, with the eastern and western ends the navy's territory and a central corridor running from the two population centers—Isabel II on the north coast to Esperanza on the south. Both of these communities host fishing associations as well as unaffiliated fishers. Currently, however, two principal factors confound any attempt to determine the number of full-time and part-time fishers in Vieques: 1) a Navy program that compensates fishers for loss of habitat due to fishing; and 2) attempts by four groups to establish fishing associations, in part as vehicles to garner resources from the state. The former initiative had led to over 300 people claiming to be Vieques fishers, attracting even people from Fajardo and Ceiba. The latter has led associations to inflate their numbers and compete for the memberships of unaffiliated fishers, making accurate counts of current members difficult.

Fishers attempting to organize have been working closely with the local agricultural extension office, whose personnel have been attempting to negotiate among various interests to distribute funds for fishing vessel purchase and to assist in such things as keeping up with changing regulations, licensing requirements, and association memberships numbers. Information from the extension agency lists the four associations as follows:

- Associación de Pescadores de Vieques
- Asociación Soberana de Pescadores Isabel Segunda, Inc.
- Nueva Alianza de Vieques, Inc.
- Associación de Pescadores Unidos de Sur

Each of these is associated with powerful figures on the island. Their leaders have had extensive experience with mobilizing people politically, engaging and taking advantage of the press, and otherwise demonstrating astute leadership abilities. While they may come together when facing a common enemy, as with 1999 colonization of naval lands, in the founding and management of fishing associations they often find themselves in conflict. Further complicating the fishing profile in Vieques is the fact that the association facilities in Isabel II are currently being rented by several unaffiliated divers for the use of their pier, market, and other infrastructure. Census data suggest that the majority of Vieques fishers, in fact, do not belong to an association, although much of the growth of associations may have taken place since the census was taken.

These data also show that Vieques fishers spend considerable time at sea. Just under two-thirds spend between thirty and forty hours per week fishing, and none reported fishing less than 20 hours per week. Nearly six percent fish more than forty hours per week. Most of this fishing is done along the continental shelf and neighboring reefs.

Table NE.14. Selected Fisher Characteristics, Vieques (n=52)

Variable	Response
Association Member	32.7
Hours Spent Fishing	
< 20 hours	0
20 – 30 hours	32.7
31 – 39 hours	30.8
40 hours	30.8
> 40 hours	5.7
Mean hours	34.46
Standard Deviation	6.357
Minimum hours	20
Maximum hours	45

Source: Puerto Rican Census of Fishers, 2002

Table NE.15. Fishing Locations and Styles, Vieques (n=52)

Fishing Location	Percent Reporting
Continental Shelf	96.2
Oceanic	23.1
Reef	96.2
Shore	21.2
Shelf Edge	23.1

Source: Puerto Rican Census of Fishers, 2002
Totals do not add up to 100% because fishers typically fish multiple locations

In terms of fishing practices, however, there is consensus that Vieques is a microcosm of a larger change that Matos, in his reports from the fisher census, had documented for Puerto Rican fisheries in general: an increase in diving and a decrease in other gear types, particularly traps, despite that traps remain important in Vieques. This process has not been uniform. In general, younger fishers migrate toward diving, often without proper instruction in the use of tanks and other gear, while elder and more experienced fishers tend to utilize a variety of gear, changing through the season.

Figure NE.13. Diver Weighing Conch, Isabel II, Vieques, on the Eve of the *Veda* (Seasonal Closure)

We visited the island near the beginning of the seasonal conch closure, which begins July 1, and the potential problems that this time of year poses for inexperienced divers became obvious as we watched divers land their catch. First, the closure had stimulated a rush to catch as much conch as possible prior to the season closing, encouraging fishers to engage in risky behaviors as they hurried to dive, capture, shell, and land conch. In his field notes, Garcia Quijano makes the following observations regarding what he calls a "diving derby":

> *"This makes three times in three years that I have observed a 'diving derby' happen as a side-consequence of the moratorium. This is worrisome because during 'derby' conditions fishers have been known (in many places) to engage in more hazardous activities. Hazards related to unsafe diving come to mind because conch fishermen are divers and collecting conch is a very time-consuming endeavor. It is more so than spear fishing in my opinion: to find conch the divers do an lengthy underwater scan of sea grass prairies and sand flats and then collect conch as they see them. This contrasts with reef spear fishing, where fishers instead go to a place where many species of fish are geographically concentrated (the reef). The work is still hard but a lot less time is spent just searching for game. The ecological knowledge of conch obviously plays a role in knowing where to look (it is not easy to find conch in the endless underwater open spaces, as novice doesn't have a chance to make a living without expert help!), but according to my first hand experience during underwater participant observation, even the most expert conch fishermen have to spend a lot of time scanning the seafloor" (Garcia Quijano field notes, July, 2005).*

Other than diving, fishers in Vieques use fish and lobster traps primarily, along with lines for catching deepwater snapper and grouper species. Vieques fishers also, on occasion, capture juvenile fish, octopus, and shellfish for the aquarium trade. Fishers interviewed in Vieques mentioned that fish and lobster traps were the most significant gear, followed closely by diving, which is rapidly competing with traps as the most significant gear. Vieques fishers also use trammel nets for bait.

Data from the census do confirm the importance of diving and the widespread use of traps, although none in the census said that they used trammel nets. Moreover, the census data show that hand lines and other line fishing (Rod & Reel and trolling) are the most widely used gear, and that gill nets are an important gear as well.

Table NE.16. Gear Used by Vieques Fishers (n=52)

Gear	Percent Using
Hand Lines	83.7
Snapper reel	9.6
Long line	7.7
Rod & Reel	36.5
Troll line	15.4
Beach Seine	1.9
Gill Net	36.5
Fish trap	28.8
Spear	50
SCUBA/ diving	46.2
Trammel Net	0
Lobster trap	26.9

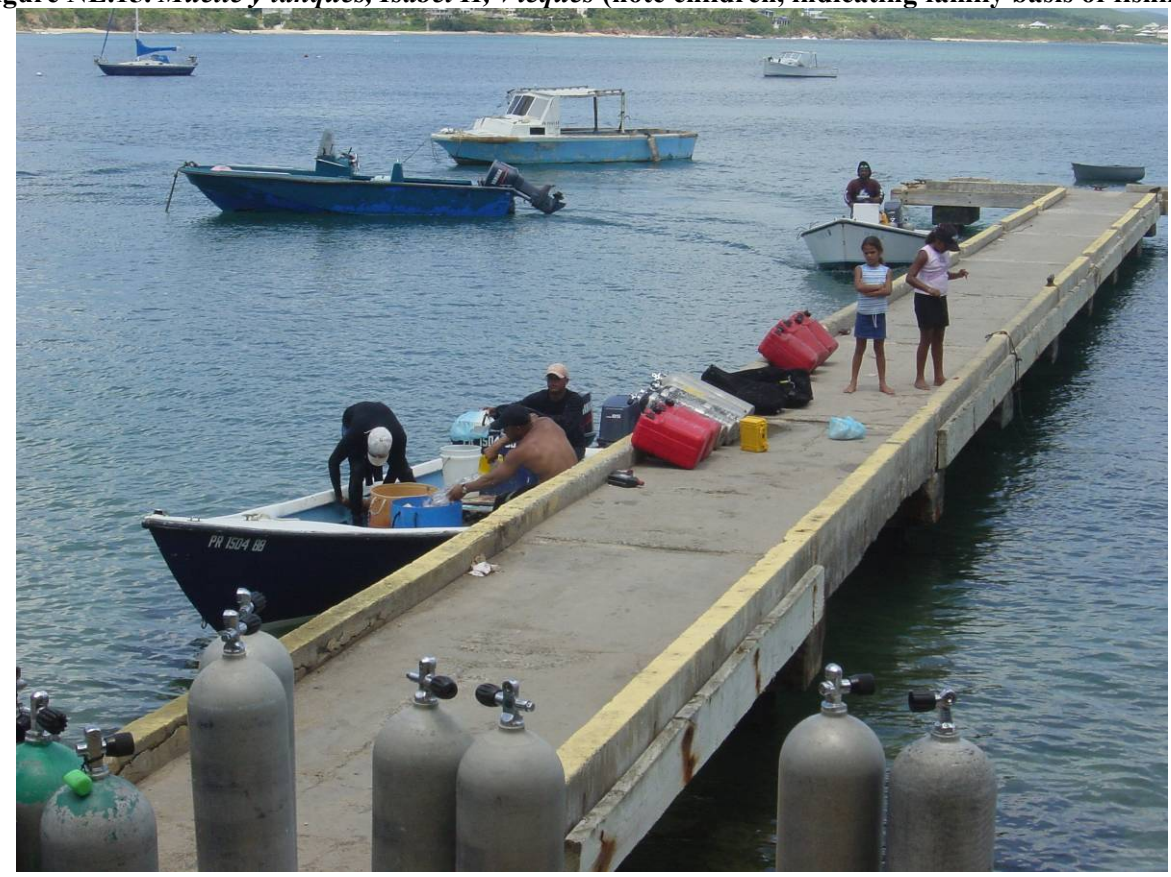
Source: Puerto Rican Census of Fishing, 2002

In general, the fishers of Isabel II tend to be younger and more concentrated on diving than the fishers of Esperanza. Esperanza fishers, more established, are more likely to combine a variety of fishing gear types through the year. Their experience is critical to their identity as fishers, separating them from younger and less experienced fishers and leading them to criticize the fishing behaviors of those with less experience than them. This last point in important in Vieques, where unemployment rates in recent years have led to an increase in part-time fishing. The leader of one of the associations told us that, beyond construction and tourism, job opportunities in Vieques are limited; construction and tourism are cyclical and seasonal in nature, and one avenue that many youth see as an easy way to make money is to fish. The problem is they enter the sea without guidance or apprenticeship. As with fishers elsewhere, experienced commercial fishers view inexperienced commercial fishers as causing problems to themselves, to the resource, and to relations between fishers and regulatory personnel. Part-time fishers expose themselves to hazards, keep lobsters with eggs, damage reefs and other substrates with poor fishing methods, and give regulators the impression that fishers care little about the resource, about reporting income or landings, or about following regulations.

Figure NE. 14. Youth Holding Bottle Containing a Juvenile Octopus for the Aquarium Trade, Vieques

While the July-October seasonal closure for conch creates problems for Vieques fishers in terms of the "derby" noted above, Vieques fishers share with fishers across Puerto Rico several other problems with regulations. As with Ceiba fishers, Vieques fishers expressed dissatisfaction with the current licensing system, which sometimes forces elder, noncompliant fishers into a category of "beginner fisher" for not reporting landings or fishing income. This is particularly humiliating for fishers who have long headed fishing families and who now occupy leadership positions within the fisheries of Vieques. One fisher we interviewed extensively, whom we call Fernando, comes from a family whose members have fished for generations. His father and uncles fish, along with his six brothers and his son. Wives and in-laws, as Griffith and Valdés Pizzini point out (2002: Chapter 4), are rarely excluded from household fishing enterprises. To establish and maintain his fishery, Fernando's wife initially went fishing with him and currently supports his as an occasional crewmember and general assistance with accounts and marketing. Despite being deeply embedded in fishing, Fernando and his son still occasionally have to take other jobs, in construction, when fishing is slow, the income from which enables them to remain fishers. Referring someone like Fernando or his father or uncles beginning fishermen thus becomes an insult not only against an individual fisher but against an entire household and extended family.

Figure NE.15. ***Muelle y tanques, Isabel II, Vieques*** **(note children, indicating family basis of fishing)**



This is doubly disturbing to Vieques fishers when they perceive that some of the people regulating the resource and calling them beginners are, first, without experience on the water and, second, basing regulations on studies conducted outside of Vieques waters, some as far away as U.S. South Atlantic states. When asked what was the principal problem facing Vieques fishers, a fisher in Isabel II said, "NOAA," specifically referring to the regulations outlines in law 278, which was posted on the walls of the fish market. Vieques fishers believe that DRNA officials possess little in-depth knowledge about the sea or its resources, and the lack of visibility of scientists conducing research in their waters has led them to believe that they are being regulated without any basis in science *that applies to their waters*. This *local* interpretation of fishery management is perhaps more important in Vieques than elsewhere; the island's unique history and position in the sea lanes leads many viequenses to believe that their situation is drastically different from even that of fishers on the mainland. This belief extends to the resource: Vieques fishers believe that their waters differ from other Puerto Rican waters, especially those of the west coast, where they believe most of the marine science is conducted.[7]

Additional problems facing Vieques fishers derive from gentrification. In Vieques this takes the form primarily of U.S. mainlanders moving to the island, buying property at prices that have inflated local real estate beyond the reach of most fishing families. Some lots (*cuerdos*) on the island are priced at between

[7] Griffith (1999) found that fishers in North Carolina, too, believed that local fishing resources were so unique that fishery managers could not regulate them based on abstract principals or studies conducted far from their waters. Their detailed understandings of a relatively confined geographical space, however, came at a cost: fishers tended to lack knowledge about others' fisheries even in neighboring waters (perhaps from respecting unwritten territorial rules) kept them from understanding that many fishers faced the same problems they faced, in and out of fishing.

$200,000 and $300,000, and even modest homes sell for well over $100,000. At the same time, municipality officials are promoting development initiatives that are unfriendly to working waterfronts, focusing on tourist development. Again, this emphasis derives, local fishers believe, from the officials' reliance on outside engineers and other supposed experts who do not appreciate the character or history of the Vieques people.

Another problem facing Vieques fishers concerns marketing. The continued presence of part-time and recreational fishers, noted above, has been not only detrimental to full-time commercial fishers from the standpoint of damage to marine resources and relations between fishers and regulatory personnel, fishers also claim that part-time and recreational fishers also dump cheap fish on the market. Fernando said, "A real fisher is someone who makes sacrifices to fish," adding that part-time fishers don't know about putting back lobster with *huevos* (eggs), selling fish that are too small, and damage the market by selling fish below cost. He went on to say that people who fish just when they are down on their luck or just to pay for expenses depress the market and make things bad for other fishermen, not following rules or destroying the environment with their fishing and boating practices, for example anchoring where they shouldn't. The following table shows the percentages using different marketing outlets in Vieques, according to the fisher census.

Table NE.17. Marketing Behaviors Reported by Vieques Fishers (n=52)

Marketing Behaviors	Percent Reporting
Fish dealer/ buyer	86.5
Association	3.8
Street vending	13.5
None	7.7
Restaurant	13.5
Sell fish gutted	1.9
Keep fish on ice	78.8

Source: Puerto Rican Census of Fishers, 2002

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On the weekends, according to Fernando, the boating traffic reaches high levels and their anchors are highly destructive of substrates. Sometimes their anchor bounce along the bottom, tearing up reefs. There are also several sources of contamination, and the resource is sometimes so contaminated (with, for example, lead) that it gets on your clothes and then you pass it along to your children. He knew that lead poisoning was particularly bad for children, saying that once he encountered lead when he had his son with him.

While pollution did show up in the fisher census in Vieques as a cause of problems with fishery resources there, it is surprising that no fishers pointed to crowding as a problem. In any case, most fishers believe that the fisheries are in worse shape today than previously.

Figure NE.16. Trap Vessel at Esperanza Association, Vieques

Table NE.18. Opinions of Fishery Resources in Vieques (n=52)

Opinion	Percent reporting
Status of Fishery Resources	
Better	1.9
The same	26.9
Worse	65.4
Reasons for problems in fisheries	
Pollution	32.7
Habitat Destruction	38.5
Overfishing	11.5
Laws, regulations, and licensing	0
Crowding	0
Seasonal factors	8

Figure NE.17. Ramp at Esperanza, Vieques with Boats in Background

Like the fishers of Culebra, Vieques fishers do face special problems in terms of the costs associated with fishing. Imports of gas, gear, and other fishing inputs are higher in Vieques than on the mainland. According to locals, a fisher's willingness to invest in fishing in Vieques is, therefore, more of a sign that they are a full-time, professional fisher. Because of this the fishers of Vieques find the designation, "bona fide" fisher highly confusing; even the local agricultural extension personnel said that the designation cause more confusion in Vieques than provide a step toward professionalizing the fishery.

Figure NE.18. Equipment Rentals for Tourists, Esperanza, Vieques

Summary

Vieques fishers consider themselves unique in Puerto Rico for their resistance to naval domination, their success at eventually halting the bombing, and their status as an island municipality with close ties to St. Croix, the other Virgin Islands (U.S. and British), and the Lesser Antilles in general. Indeed, one of the fisher leaders we interviewed in Vieques said that he would like to see Vieques achieve independence from the rest of Puerto Rico. This identity of uniqueness extends to fishery regulations and their belief that many of the regulations currently in place, developed based on fishing practices and fisheries research elsewhere, do not apply to them.

How this translates into the impacts of regulations is difficult to tell. We witnessed first hand the problems that attend the *veda* (closure) for conch, underlying the "fishing derby" mentality that results, in some cases, in hazardous behavior among divers. That Vieques fishers question the legitimacy of regulations is some indication that they are unlikely to comply fully with them, particularly when some of their leaders are considered "beginners" in terms of the currently licensing structure. Clearly this undermines local attempts to professionalize the fishery in a way that cuts down on the destructive practices of part-time fishers who jeopardize themselves and the resource with hazardous and damaging fishing practices. Nevertheless, in an island society like Vieques, fishing continues to provide an alternative to sporadic and chronic unemployment and those who know how to fish safely and in an environmentally conscientious way are willing to teach those whose knowledge and environmental sensibilities are less well developed. Through the development of an apprenticeship program, the four associations that currently vie for unaffiliated members may be able to diffuse some of the current conflicts that exist among them, coming together in their shared interest in protecting the resource in the same way they came together, successfully, during the 1999 colonization of naval lands.

Culebra

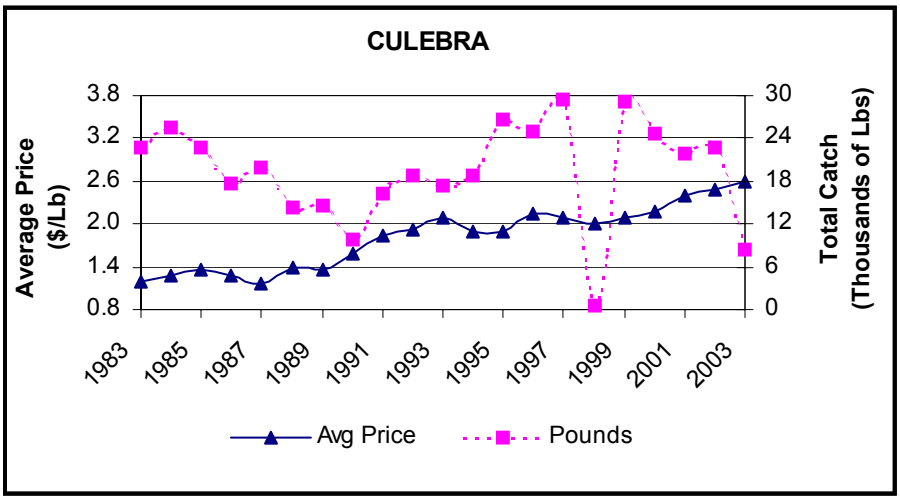
Of the four municipalities in the northeast region, Culebra was the last settled and currently the one most dependent on imported goods from mainland Puerto Rico and elsewhere. Guillermo Iranzo, in his *Etnografía de Culebra* (Ethnography of Culebra), calls Culebra one of the Lesser Antilles, explaining that its relatively dry climate and lack of high mountainous terrain, combined with its small size (3,342 hectares), has resulted in few available natural water supplies, a factor prohibiting settlement on a large scale. Today's permanent population is only around 1,500, around 200 of whom are immigrants from the U.S. mainland, and prehistorically and historically the island was known more as a way station in inter-island shipping and navigation than as a place of permanent residents. This is true even of migrating bird populations, and today Culebra's mangroves and other forests "serve as a refuge for endangered birds" (Iranzo 1995: 1).

Table NE.19. Culebra Census Data

CULEBRA	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	887	573	732	1,265	1,542	1,868
Civilian Labor Force (CLF) [2]	233	180	322	502	639	701
CLF - Employed	232	172	296	485	596	583
CLF - Unemployed	1	8	26	17	43	118
Percent of unemployed persons	0.43	4.44	8.07	3.39	6.73	16.83
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		56	53	19	8	0
Construction		8	33	36	104	87
Manufacturing		12	5	177	119	62
Retail trade		16	22	24	75	73
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	9.0	9.5	12.1
Persons who work in area of residence [6]		160	262	479	554	531
Per capita Income (dollars) [7]			1,237	3,670	4,488	8,901
Median Household Income (dollars) [8]		N/A	3,038	9,375	12,143	17,008
Individuals below poverty level [9]			395	508	677	688
Percent of Individuals below poverty level			53.96	40.16	43.90	36.83

Culebra's economic profile compares well with many other coastal municipalities, with comparably low rates of both poverty and unemployment. Its fishing has been declining in recent years, as indicated not only by the census data and ethnographic information, but also by the landings data, which suggest declining catches from 2000 to 2003 (see Figure NE.19). This was after rising catches through the 1990s (with the exception of the drop from 1998 to 1999, which may be a reporting error).

Figure NE.19. Culebra Landings Data



Culebra Prehistory and History

Perhaps more so than most other Puerto Rican regions, the Taínos who settled Culebra originally depended extensively on fishing and the collection of near shore shellfish and crabs, maintaining the seafaring tradition that carried them there throughout their residence. Taíno encountered Culebra, the scant archaeological evidence suggests, during the 14th century, founding a society that mixed marine-related subsistence patterns with gardening, collecting fruits, and hunting. They had a distinct ceramic tradition yet didn't succumb to the organizational seduction of social classes or ranks, instead organizing themselves into extended nuclear families.

Iranzo speculates that the original settlers may have been fleeing conflicts elsewhere in the Antilles, seeking refuge as much from domination as from war. Even in Taíno communities not involved in territorial disputes or raiding neighbors for women, powerful Taíno caciques were known to have subordinated their subject populations to the point of exacting labor taxes for public works. The sea provided escape, and tiny islands like Culebra sanctuary.

Among Taíno technological achievements were fishing nets, which were evidently used primarily by men. Women hunted small animals and cultivated tubers and grains, and were the vehicles for tracing descent and matrilineage membership, instrumental in forming alliances among families for defensive purposes. Iranzo argues that warfare was common during the years prior to Spanish colonization, and that Culebra most likely fell within the hegemony of Guadelupe, largest of the Lesser Antilles and influential across a broad area. Vieques, Culebra, and the U.S. and British Virgin Islands would have been at the outer margins of Guadelupe's power.

Warfare continued to influence Culebra's development for the next several centuries, at least until the mid-20th century, when the people of Culebra experienced similar pressures from the U.S. Navy to provide it with training grounds for troops. Early Spanish and other European interactions with the caciques of Culebra were similarly distressing. Typically Spaniards enlisted caciques to help them with mining, ranching, and other economic enterprises, particularly in providing labor, and in return the caciques, as much a possible, used Spanish power in their own internal (now externalized) struggles.

Spanish colonization of Culebra was neither swift nor pressing. Very likely disease depopulated the native Taino villages, carried to the island on pirate ships and through fugitive slave and smuggling networks during the chaos of early colonization. Spaniards imposed the encomienda system[8] on the island as early as the 16th century, but fugitive slaves, pirates, and profiteers continued to utilize Culebra as a base of operations, contributing to its reputation as a place of refuge and resistance. Contraband, slaves, and manufactured goods continued to arrive from Europe and Africa, and Culebra's local elites traded agricultural products and livestock for them. Much of this traffic was a kind of spillover trade from Culebra's proximity to St. Thomas, which emerged early as a key place of maritime commerce. Culebra's deep water port, still critical to commerce today, also played a role in this trade. Not until the late 19th century, however, did permanent residents begin to outnumber transients in Culebra. Charcoal making became a principal activity, stressing local forests so much that, by 1869, an official inspection of the forests found them in poor condition (Iranzo 1995: 8).

The inspection of forests was indicative of increasing state interest in Culebra. By 1875, the governor of Puerto Rico, worried that Culebra might serve as a beachhead for a foreign invasion and aware of its reputation for piracy, initiated efforts to colonize the island. In 1877, he sent eleven armed men from Vieques to colonize Culebra officially, but it wasn't until five years later that Puerto Rico commissioned Manuel Garay to assume control of Culebra's ports and shipping between San Juan and Culebra began in earnest. Following this, the state divided up the island into 96 lots, assigning most of them to the current inhabitants and, in the process, founding four barrios within the purview of the Puerto Rican state apparatus. A few areas, primarily those adjoining the coastal areas and lagoons, remained under the direct control of the state. By 1886 there were 86 permanent inhabitants and three small businesses. Six years later there were 519 people in 45 houses with one church, one pier, one school, and a public cistern. Fishing was a key occupation. "Like other littoral zones," Iranzo writes (1995: 10), "in Culebra there developed a culture of fishers who combined fishing with subsistence agriculture." These fisher-farmers were producing their own nets and traps for local use and sale and, by 1894, exporting livestock, tobacco, beans, corn, and plantains.

Like other municipalities in the northeast, Culebra was occupied early in the Spanish-American War. The most brutal period of U.S. occupation occurred later, however, in 1902, when the Navy took control of St. Ildelfonso, one of Culebra's two large towns, and "dismantled" the population. Iranzo argues that: "the presence of the Navy has been the principal factor around which has revolved the sociohistorical development of the island during the present century. Areas such as the economy, demography, culture, politics, including the ecology, have been under its direct influence during the entire period in which they remained on the island (1902-1979)" (1995: 11).

Over the past thirty years, they island has changed in ways that those familiar with Puerto Rico's coast might suspect: increasing development oriented toward tourism and leisure uses of the coast, a decrease in households directly dependent on fisheries or agriculture, an expansion of transfer payments and other state assistance, and some industrial development stimulated by the 936 tax laws. Through all this, hostility toward the Navy and federal government lingers. Ambivalence toward the U.S. government derives from culebrenses' hatred of the Navy on the one hand and their appreciation for various state-funded projects that provide employment. Major employers are three pharmaceutical firms and Abbott Labs (makers of medical supplies), thus linking the fates of culebrenses to the health care industry.

[8] *Encomienda* was a system that granted rights to people and their labor to an *encomendero,* who reported to the Catholic Church and the Spanish Crown. In return for the use of labor, the encomendero was supposed to Chrisianize the people under his rule.

Fishing in Culebra

Our work in Culebra suggests that fishing was formerly more important there than it is at present, with the construction industry primarily responsible for siphoning fishers away from the sea. This seems opposite the situation and Vieques, where unemployment has caused an increase in fishing. Yet what is currently occurring in Culebra could follow the same route as what occurred in Vieques: construction projects and other economic developments could first attract workers to the island, yet subsequent downturns in employment could occur with the completion of projects or the closing of factories, pushing people toward fishing.

Currently, the single association in Culebra has 35 part-time members; according to an official there, not one of these participates in the bona fide program. Formerly, the association had as many as 51 members. Most of these members were born into fishing families and continue to teach their children the skills of fishing; however, others who belonged to the association previously, also from fishing families, have since taken jobs in construction. The part-time nature of fishing in Culebra is reflected in the information on hours spent fishing from the census. Unlike Vieques, nearly a third of Culebra fishers fish fewer than 20 hours per week.

Table NE.20. Selected Fisher Characteristics, Culebra (n=24)

Variable	Response
Association Member	50
Hours spent Fishing	
< 20 hours	29.2
20 – 30 hours	50
31 – 39 hours	4.2
40 hours	16.7
> 40 hours	0
Mean hours	21.71
Standard Deviation	12.723
Minimum hours	0
Maximum hours	40

Source: Puerto Rican Census of Fishers, 2002

This is also reflected in marketing activity. The association officials we interviewed in Culebra reported that only 4 association members sold their catch, the majority to the association. He said that 75% of the catch was sold to the association, 15% to the community at large, and 10% to restaurants. The census information was difficult to decipher, with over 80% mentioning they sold to the association yet two-thirds of those interviewed also saying that they had no marketing strategy.

Table NE.21. Marketing Behaviors in Culebra (n=24)

Marketing Behaviors	Percent Reporting
Fish dealer/ buyer	4.2
Association	83.3
Street vending	4.2
None	66.7
Sell fish gutted	8.3
Keep fish on ice	29.2

Source: Puerto Rican Census of Fishers, 2002

Among the fishery's most important resources is a gas station, originally to service the fishing fleet but eventually providing gas to passing marine traffic, generating the association an income of up to $10,000

per week. Association administrators are worried that ferry schedule changes will affect this source of revenue, because they will have to pay demurrage for the gasoline truck. Nevertheless, their willingness to provide fuel to the community is evidence of their integration. In addition, two fishers at the association also interact with the recreational traffic by providing water taxi services ("six-pack for hire") to tourists. Further, the association sells fish at bargain prices ($3.00/ pound), with only a 25% mark-up from the ex-vessel price of $2.25 per pound. Locals reported that their diet is rich in seafood, and that many of the American and European tourists staying in the Guest Houses desire seafood as well, creating a market that, occasionally, is supplemented with fish from Vieques and Fajardo.

Unique to the fishery profile of Culebra is its mariculture operation, run by the University of Miami, called The Snapper Farm, Inc. This operation grows cobia from larva for six months to weights of between 25 and 25 pounds, and exports between 70% and 75% to New York and Florida, selling the remainder to the community. They hire three divers to work their waters at $9.00 per hour, and the Navy donated them a 90-foot vessel that they are currently repairing. They are trying to grow lobster and dorado in a similar fashion, but their success with snapper has been disappointing. Snapper Farm-raised fish is more expensive than wild species, $4.00 per pound, but they occasionally provide the association with cobias that the association then resells. Annually, they harvest around 40,000 to 45,000 pounds.

Figure NE.20. Culebra Fishing Association

Fishing practices are similar to those in practice in Vieques, with hand and other lines most common but divers and trap fishers also important in the fishery and the use of cast nets important for bait. Our interviewing revealed that, according to the perceptions of locals, part-time diving and trap fishing were the most important gear used. Most of these are made locally, with some locally-purchased materials and others imported from Isla Grande (wire and bouys), Ceiba and Humacao (ropes), and Miami (ropes and bouys).

Figure NE.21. Boat Repair Facilities at Culebra Fishing Association

Table NE.22. Gear Used by Culebra Fishers (n=24)

Gear	Percent Using
Hand Lines	70.8
Snapper reel	4.2
Long line	17.4
Rod & Reel	16.5
Troll line	50
Beach Seine	0
Gill Net	0
Fish trap	33.3
Spear	33.3
SCUBA/ diving	33.3
Trammel Net	0
Lobster trap	25

Source: Puerto Rican Census of Fishers, 2002

With these gear they target several species, as is common across Puerto Rico's fisheries. Traps catch lobster, colirubia, sama, cherna, and mero. With lines they target colirubia, cherna, and pelagic species, principally sierra, and divers target principally lobster, conch, and other bottom fish. The areas they fish, according to the census, are outlined in the following table. Clearly, the reefs and continental shelf are the most commonly fished. Far from being opposed to the marine reserve in Culebra, association personnel reported that Culebra fishers were instrumental in getting it put in place, perceiving the need for the reserve in the wake of Naval activities. They also consider themselves pioneers in protecting species such as *jueyes,* or the land crab and actively support local research on coral reefs, on the reserve, and programs in which students in Culebra schools learn about marine ecosystems and their importance to the health of the island and its keys. This includes working with a local center for the aid of families run by Dominican Sisters, the Ford Foundation, which has given the association a grant of $11,000 to study life

of the coral reefs, the local 4-H club, and with Fish & Wildlife as they educate school children about the importance of mangroves in marine ecosystems.

Table NE.23. Fishing Locations and Styles, Culebra (n=24)

Fishing Location	Percent Reporting
Continental Shelf	100
Oceanic	0
Reef	100
Shore	25
Shelf Edge	37.5

Source: Puerto Rican Census of Fishers, 2002
Totals do not add up to 100% because fishers typically fish multiple locations.

Fishers in Culebra are currently very concerned about the mangroves. As noted earlier, the forests of the island have always been stressed by local populations for wood, charcoal, and other products. Today they are stressed primarily by coastal development, standing in the way of coastal construction. Ironically, the naval presence, so damaging in other ways, protected the mangroves through the 1970s; since they people have been cutting them for a variety of reasons, and fishers view this as a threat to the resource. This information came from our interviews. Interestingly, those surveyed in the census didn't mention habitat destruction as a cause for fish declines, but pollution and overfishing.

Table NE.24. Opinions of Fishery Resources, Culebra (n=24)

Opinion	Percent reporting
Status of Fishery Resources	
Better	0
The same	8.3
Worse	54.2
Reasons for problems in fisheries	
Pollution	4.2
Habitat Destruction	0
Overfishing	50
Laws, regulations, and licensing	0
Crowding	0
Seasonal factors	0

Source: Puerto Rican Census of Fishers, 2002

In addition to the problems with mangroves, Culebra fishers, like those from Ceiba and elsewhere, noted the recent problems with licensing, mentioning that it has been confusing and unfair and, again, that elderly fishers, with deep knowledge, have been issued apprenticeship licenses. Some have left the fisheries because of this, humiliated. This is particularly disheartening at this historical juncture, at a time when older fishers are critical to working with those organizations noted above to improve marine literacy among the youth of Culebra. More directly, the association has proposed a project to teach, formally, the "fishing arts" to Culebra youth; clearly, those elder fishers with extensive knowledge of fishing and marine ecosystems could be important resources in this effort.

Finally, Culebra fishers are, more and more, feeling the pressures of gentrification. Real estate prices are rising rapidly, they say, making it difficult for working people to acquire land and housing. Currently pieces of property for sale, once sold, will likely reshape waterfronts and coastal landscapes. Past experiences suggest that they will likely not benefit from such changes. Before Hurricane Hugo, for example, they possessed a dry dock facility near the gas station, but after Hugo destroyed much of it the

municipality repaired and appropriated it by ordinance. Currently they are working with the mayor to regain control of the facility.

Summary

As an island municipality heavily influenced by the U.S. Navy, Culebra shares many of the same experiences as Vieques, except that in Culebra the result has been a decline of numbers of fishers along with an evident decline in fishing activity among those who remain. Apparently members of the association in Culebra have been increasingly supplementing fishing incomes with other sources, either collectively, as in the gas station or with the grant from the Ford Foundation, or individually, providing rides to tourists. Their interest in promoting knowledge of fishing and of marine ecosystems, directly or through their assistance to other educational programs, also indicates a sense of stewardship that is heartening. Unfortunately, currently licensing requirements may stall these efforts at the very time they are most needed.

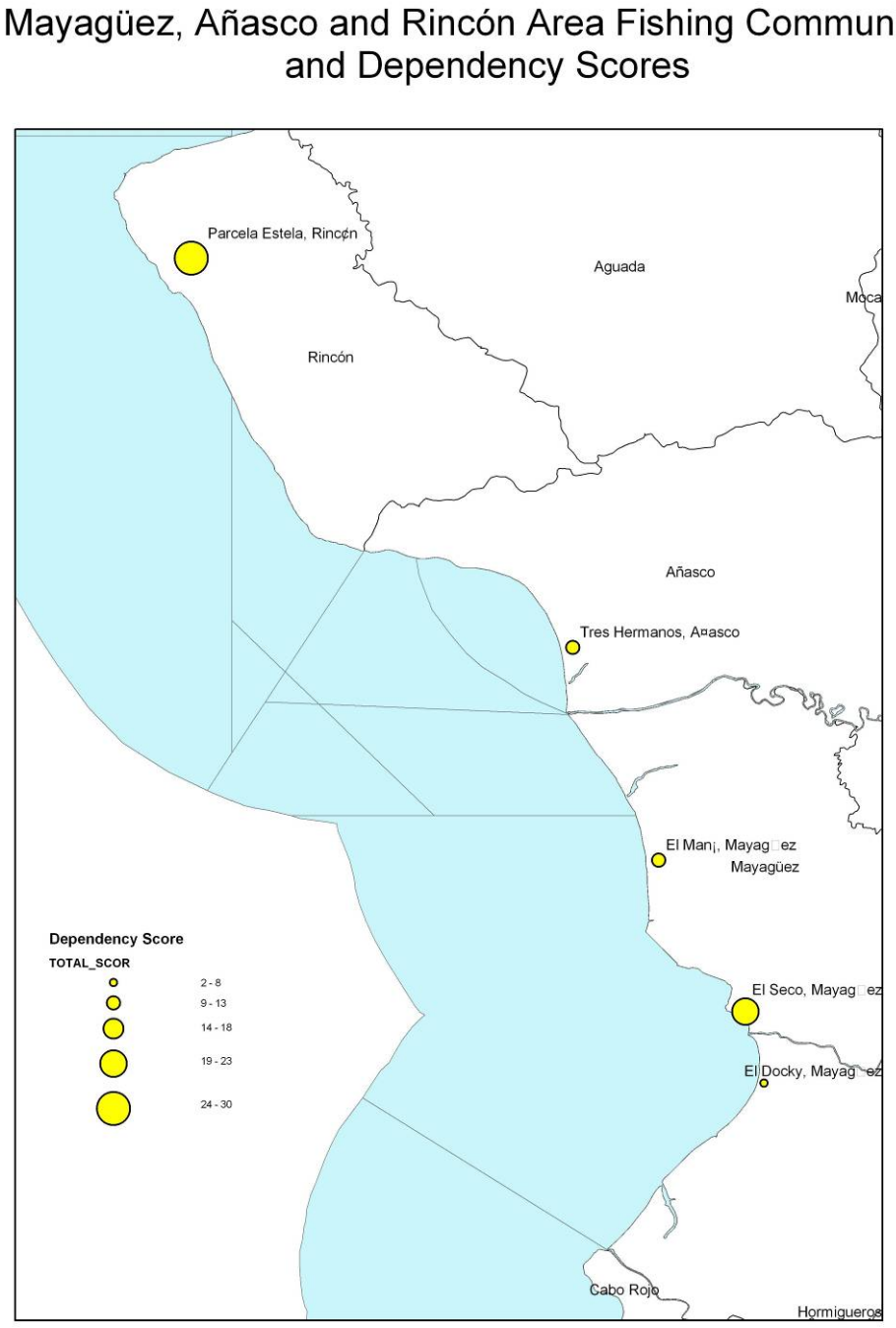
Figure NE.22. Cabanas Across Channel From Fishing Association

Western Metropolitan Municipalities:

Mayagüez, Añasco, Rincón

As the second largest metropolitan area in Puerto Rico and the center of marine science, this region is among the most important for fisheries in Puerto Rico from the perspective of advanced fishery knowledge and the recent development of innovative fishing practices. With the University of Puerto Rico, Recinto Universario Mayagüez (RUM), and the offices of the Departmento Recursos Naturales, Mayagüez is important as the center of fishery science as well as, historically, home to the large tuna canneries near El Maní. Among its most important assets in terms of the islands' fisheries is that the university is home to the UPR Sea Grant College Program, with its marine advisory service and active research agenda, and its links to research stations in Parguera and La Mona. Although the tuna canneries closed, after nearly 40 years, in the late 1990s and early 21st century, Mayagüez still has a ferry terminal to the Dominican Republic, three active fishing associations, and a sport-fishing sector. Another small association, Tres Hermanos, is located just north, in Añasco; many residents here commute to Mayagüez to work. Finally, Rincón is unique in its recent acquisition of crafts from the municipality and the municipality's investment in its fisheries. Fishers here exploit the resources between the Rincón coast and La Mona, attempting to become the most professional deep-water fleet in the west. The innovative and politically engaged fleet of Rincón fit well with the status of this region as a center of fisheries and marine resources research.

Map WM.1. Western Metropolitan Municipalities



Mayagüez

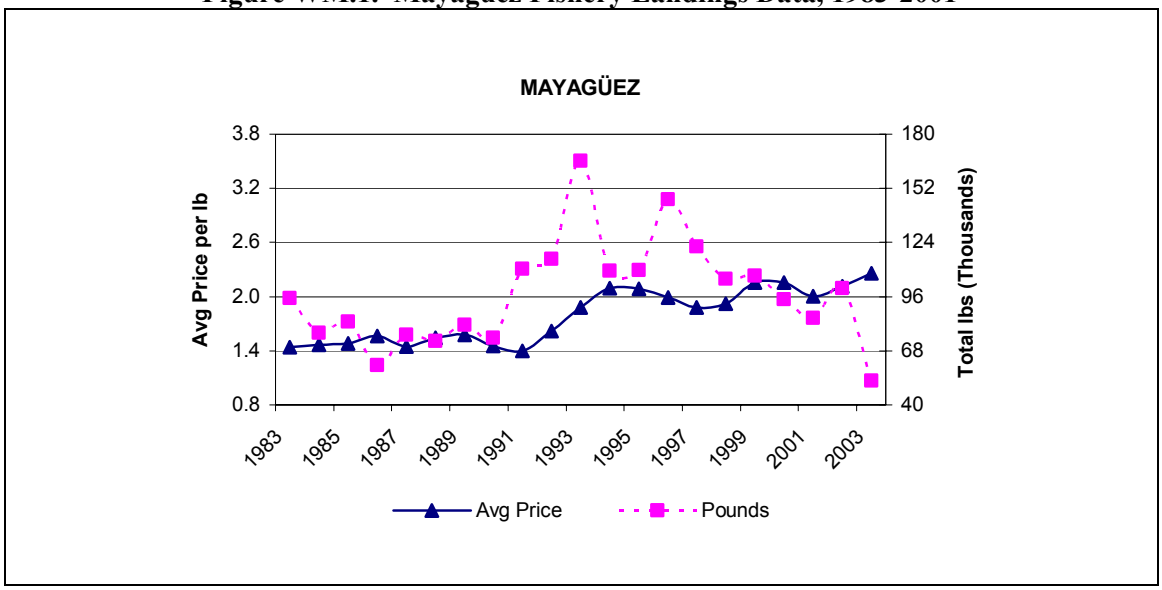
With the large western city by the same name, the municipality of Mayagüez has three significant commercial fishing centers, one active recreational fishing center, and a number of locations where a handful of fishers store their small vessels and land their catch. With the large metropolitan area, Mayagüez is one of the largest western municipalities with a more diverse economic profile than many of the other, predominantly rural municipalities. The retail sector in particular is large, rivaling manufacturing, which has declined over the past decade.

Table WM.1. Mayagüez Demographic Data

MAYAGÜEZ	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	87,307	83,850	85,857	96,193	100,371	98,434
Civilian Labor Force (CLF) [2]	27,906	22,968	24,289	29,512	34,549	29,691
CLF - Employed	26,631	21,488	23,142	25,101	27,615	22,867
CLF - Unemployed	1275	1480	1,147	4,411	6,934	6,824
Percent of unemployed persons	4.57	6.44	4.72	14.95	20.07	22.98
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		2,640	1,007	593	451	260
Construction		1,848	2,163	1,483	1,780	1,615
Manufacturing		5,384	6,456	6,659	6,738	3,982
Retail trade		3,212	3,786	3,757	4,361	3,401
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	N/A	18.8	22.9
Persons who work in area of residence [6]		19,248	19,172	19,048	23,933	18,167
Per capita Income (dollars) [7]			1,007	2,313	4,380	8,003
Median Household Income (dollars) [8]		1,062	2,354	5,533	8,007	11,775
Individuals below poverty level [9]			53,425	54,240	57,902	50,805
Percent of Individuals below poverty level			62.23	56.39	57.69	51.61

Against this background, fishing today plays a minor role in the local economy, although as recently as four years ago tuna canneries employed several hundred workers, having declined from a high of around 3,000 to 4,000. The canneries have since closed, however, and most of the former tuna workers have entered the ranks of the unemployed, migrated to the U.S. mainland, or found work in the informal economy. One displaced tuna worker we interviewed, for example, reported surviving on credit at a local *colmado,* selling *frituras* (fried pastries) from her house, and sewing for people (see Section III for additional discussion of the canneries). Most of the fishers in Mayagüez fish either casually or part-time; over two-thirds of the 48 fishers captured in the fisher census fish for fewer than 40 hours per week. In the catch statistics, Mayagüez ranked 13th, just below San Juan. As in other municipalities, fishers here use nearly the full range of gear, but line rigs predominate, including the multi-hook rigs called *cordel* and *palangre*.

Figure WM.1. Mayagüez Fishery Landings Data, 1983-2001



Based on the landing data, fishing from Mayagüez peaked in the early 1990s and again in 1997 for the last time, after which the decline has been more or less steady (again, this may reflect a trend in reporting, as one of the fishers we interviewed suspects). Prices reflect supplies sporadically (correlation coefficient = .2637). Because Mayagüez is a major urban center, the price of locally landed fish may be less sensitive to supplies because of the availability of imported fish in the large supermarkets and other food stores of the town.

Mayagüez History

Like many coastal municipalities, Mayagüez takes its name from a Taino name, Yagüez, although the name of a river rather than a cacique. Officially founded by the Spanish in 1760, in its first dozen years of existence it managed to grow to 1,800 inhabitants who, together, had built themselves over 50 houses and had begun the construction of a church. Its status as a port facilitated rapid subsequent development, its population expanding ten fold over the next six decades. By 1835 it had received official status as a *Villa*, or recognized town, built a town hall, and erected along its port four armed towers, although some of its most important settlement areas were lost to a fire in 1841.

As a precursor to becoming the educational center it is today, Mayagüez distinguished itself early as a center for the free exchange of information, becoming the second city in Puerto Rico to have a press, *El Imparcial de Mayagüez* (The Impartial of Mayagüez), established in 1848. Architecturally, it was the first city in Puerto Rico to construct, in 1866, a functioning aqueduct. When Puerto Rico fell to the United States in 1898, Mayagüez citizens held protests for and against the change in government, and troops had to be called in to restore order.

During this time the population not only grew, it became more diverse. As a port city, it attracted people from around the world, becoming a major center for the export of agricultural products produced throughout the west. Like peasant farmers and plantations in other coastal municipalities, agricultural producers in Mayagüez produced sugar cane, rice, and fruits and, in its highlands, coffee, which they continue to produce today, hiring Dominican labor. At the turn

of the century Mayagüez had become a municipality of over 35,000, with people from 17 different nations. It had at that time thirty-three schools.

The university was first established in 1909, at the same time a railroad that linked San Juan and Ponce to the city was completed, and the agricultural experiment station shortly thereafter. Parts of the city, as happened across the island, were destroyed in the 1918 tsunami, but the city continued to grow. Towards the middle of the 20th century Mayagüez began receiving immigrants from not only the Dominican Republic, but also from throughout the island, including people from San Juan.

Fishing in Mayagüez

El Seco

This association adjoins a long strip of *carretera* or road that follows the curve of the bay, on the north edge of the metropolitan area of Mayagüez, past a housing project called Concordo. At the north end of the road, nearest the housing project, is a recreational area with ball fields and some other play facilities, along with a few *muelles*, a club for fishermen, a stand where they sell beer, *pinchos, empanadillas*, etc., and a large recreational facility that sits on the water and is still under construction. Among the area's attractions is a larger anchor (*ancla)*, which the Corporation for the Development of the West bills as a 300 year old anchor that was placed there with the aid of three fishing families, two of which have the last name of a famous fishing/ maritime family in this area.

Figure WM.2. Three Centuries' Old Anchor on Mayagüez Waterfront

This anchor is significant in a metaphorical sense: the anchor and the festival of the Virgen del Carmen (described in detail below) are reflections of one another. The festival is one way of anchoring the fishing community to the larger community/ coastal barrios of Mayaqüez, with the anchor there to suggest that however much fishing families may be drifting about in a sea of regulations, alternative employment opportunities, trends in seafood markets, and so forth, they

are still bound to this place, this location, and they have this three-hundred year-old artifact of maritime trades and this annual rite of intensification (the festival) to prove it.

Most of the facilities at this end of El Seco, along the road named after the Virgin, Carmen, seem more oriented toward recreational & social activities, and indeed this was where the Virgin ends up after its procession through the water and across the land. As you move south along this road, following the bay, however, you also follow the beach and see people in pavilions having picnics, playing dominoes, and 2 to 3 more vendors selling *pinchos* and other foods and drinks.

At *El Seco* landing center, on the south end of Calle Carmen, there is are the typical lockers and yolas around, along with a fairly nice restaurant/ bar and another stand where they sell cooked seafoods. At the north end of this was a cluster of boats where a man was cleaning and selling fish directly from his boat to consumers, a small scale (balance) there by the cleaning table.

Like Playa Santa in Guánica, this association has close ties to the recreational activities of the municipality, building on its proximity to significant marine recreational infrastructure, a public beach lined with picnic pavilions, and to the urban neighborhoods of Mayagüez. The relations between the commercial fishers who belong to the association and the community at large, its recreational sector as well as the general population, become manifest every July Sunday following the day of the Virgen del Carmen, the patron saint of fishers. The festival, repeated over and over by fishing associations and groups across Puerto Rico, is one way the fishers demonstrate their moral claim over the region's marine resources, at the same time able to illustrate their commitment to their craft to the community at large.

Celebration of the Virgen del Carmen (Virgin of Carmen), Patron Saint of Fishers

The procession is impressive, and similar processions and celebrations take place at all the *Villas Pesqueras*/ landing centers and communities or barrios where fishing is important and even some where full-time commercial fishing is in decline. Early in the day the Virgin, represented as a Madonna-like statue carrying a small child, is surrounded by fresh flowers and placed on a table in the center of the chapel. People begin to gather to pay their respects to the Virgin during this time, taking photos of her through the bars, crossing themselves, genuflecting, and otherwise demonstrating their thanks.

As the festivities begin, people gather to watch from lawn chairs, beach towels, and their cars, and the area begins to hop. Parked cars line the roadway. Families and individuals gather on balconies, at *muelles*, on the water in recreational boats, on jet skies, and along the shore in view of the water parade. Having taken the Virgin on a procession along the highway, showing her off to the town, the fishers then carry the Virgin onto a boat out in the water. Out on the water several crafts participate in the procession, with a few jet skis zooming in and out of the line to give it an animated, lively look. Once they have trailed along the horizon for a few minutes, they turn toward shore to land the Virgin. This is the moment of excitement. People press forward toward the *muelle* where they will land the Virgin, coming up close, crowding together, taking photos, some whistling and clapping. Between six and eight people carry the Virgin down the dock on their shoulders. She is surrounded by flowers, held high, with a child in her arms.

Figure WM.3. Fishers Carrying the Virgin of Carmen, El Seco

Figure WM.4. Fishers Carrying the Virgin of Carmen, El Docky

As the Virgin clears the dock the applause begins in earnest; shortly thereafter, queuing up behind her, several people begin singing a song in praise of her, a hymn, and follow her to the chapel, where she was resting earlier in the day. Others, in front of the procession, begin shouting, *"Arriba Virgen del Carmen" or "Viva Virgen del Carmen."* In one of the processions we witnessed, one of the men preceding the procession, by the way, walked with difficulty, handicapped as though from the bends.

Inside the chapel, at El Seco, they held hands around her, prayed, and then again sang the hymn in praise of her. People crowded the entrance to the chapel, though not all went in; some, though not all, crossed themselves, coming and going or even just standing at the Chapel's entrance. The ceremony inside went on without much attention to the crowd. Others told us that this was part of the *novenas* (nine days of prayer) and really a culmination of three days of active festivities.

Planning for this must involve fishing families' attention for several other days at least, decorating the *lancha*, planning the procession, acquiring the flowers, having commemorative shirts printed, arranging for the time to devote to this and the prayer.

Figure WM.5. The Virgin of Carmen Entering Her Chapel, El Docky

The ring around the Virgin wore commemorative t-shirts about the day, of which there were at least two varieties, and some of them wore sailors' caps, white, with black celluloid bills and yellow stripes, similar to those you see on commodores or yachtsmen. These were the fishermen, however, the members of the association.

This, then, was the ceremony. The other we witnessed went similarly: the procession, the applause, the hymn in praise of the patron saint of fishing… Equally important from a community perspective, however, were the various activities surrounding the central celebration: fireworks, social gatherings on the balconies of the neighborhood facing the beach, groups of all ages gathering to view the festivities, participate, applaud, sing, and buy food and drink from the vendors. Every trashcan overflowed as high as it could with the refuse of these purchases. These were 50-gallon cans and the trash stood at least 2.5 feet above them.

Through events of this nature, the community/ *parcelas/* neighborhood immediately adjacent to fishing centers, along with others from deeper inside the Puerto Rican interior, from Mayagüez and other municipalities, embrace while appropriating the fishing identity just as the fishing families embrace while appropriating the community as part of its being, its identity, and, most importantly, the seat of its soul, where the little chapel that houses the Virgin all year stands. In this way the two become intertwined in a way, for a moment at least, that makes them difficult to extract from one another. How to sustain this over the course of the year is something left up to the markets, but this event is not without its economic significance. In a time when much is being lost, when poverty and unemployment are high, events of this nature may enable some jump-starting of economic processes, with small vendors from lottery-ticket sellers to those who own

the *pinchos* and *empanadilla* stands bringing in cash and buying their supplies, propane, ice, and other products.

El Docky

This is the fishing association about at the end of one of the main streets running east-west through the town of Mayagüez. They too celebrate Carmen, in pretty much the same manner as El Seco, though at a different time of day and with far fewer people. Instead of the hundreds at the El Seco afternoon procession, there were perhaps 80 to 90 individuals here, not all of whom were fishermen but certainly many of whom were tied to fishing families. Fishers used their association lockers to host small gatherings of people, as though tailgating at a football game. (On a comparative note, one of the differences between this festival and the other, in addition to the sheer volume of activity, was that this was set in an area that was exclusively a fishing association, while the other ended up at a major recreational center that serves the community of Mayagüez as well as the social activities of commercial fishers of El Seco.)

Association members of El Dockey, in choosing the location for the festivities and the time of day (11:00 am), may have been consciously keeping the festival as much to themselves as possible, though they clearly didn't exclude the public and didn't mind that people were there to watch. Nevertheless, in addition to ending the procession in an area that was exclusive commercial fishing territory, there were no people there selling any drinks or cooked food, as with the other. The people there seemed no more devout, but they were obviously quite proud of their work for the day. The chapel here is within the fenced grounds of the fishing center.

The association claims to have 27 members, but most of them are part-time fishers. Their official name is the Association of the Virgen del Carmen, Sector El Dockey. They fish primarily with the *cordel*, a hook-and-line rig, catching primarily group and other reef fishes; some of the fishers fish at night for *carite* (another name for kingfish), which they claim are most abundant when there is no moon. The phases of the moon determine much of their fishing activity.

The association has no freezer and so the members aren't obligated to sell to the association. Most of the fishers have their own freezers and sell the fish however they can. Most, too, have their own vessels, but the association president complained that most of the vessels and their motors were small and not very powerful; the longest vessel, he said, was 16 feet. Their vessels, he said, were also in poor condition, which prevented them from venturing too far out to sea.

He classified the sea into three sections: *agua sucia* (near-shore, foul water), *agua verde* (green water, further from shore), and *agua azul* (blue water, very far off shore). He said that primarily the youth of fishers fish *agua sucia* when they aren't in school, catching small and juvenile species, including barracuda, while most of the fishers from the association fish *agua verde* but would like to be able to fish *agua azul.* In *agua verde* they catch grouper and snook, primarily. The few fishers (not necessarily from his association) who fish *agua azul* he described as "living in houses of cement, having large vessels, and no debts." He said that they catch primarily red snapper and large *manchego* (lane snapper).

The fishers of El Docky, by contrast, he described as predominantly illiterate, without facility for expression. Politicians come to them when they want votes, but make promises they never keep. Like many fishers, the fishers here have difficulties with the Department of Natural Resources, saying that they make laws without any explanation. Such comments are often made in the shadow of environmental knowledge: in this case, for example, the association president first spoke of other fish using the shells of the conch for protection; thus, the closure on conch robs

these other species of safe harbor at the same time that garbage and coastal development are ruining the water. He said that his son, a graduate student in marine science, studied conch and found that they played a crucial role in protecting other species, but that the DRNA refused to listen to his findings.

Perhaps because of this, he said, "The people are very frightened of panels and statistics." Currently, they would like to be able to build a ramp, but can't get a permit. They view the DRNA as their enemies, he said. They protect the environment at the cost of those who make their living from the environment.

Villa Pesquera El Maní

El Maní is a small association in the large parcelas by the same name that sits near the old tuna canneries and marine industrial district. It is a busy community with several *colmados* where people gather and a working class population that included the former tuna cannery worker we interviewed. The association sits on the water, near the south end of El Maní. While 14 fishers belong to the association, only around 7 or 8 are fishing now and only two of those sell their catch directly to the administrator. Thus, like other associations, it is a mix of casual, part-time, and full-time fishers, tied to the association by various threads, some only using the facilities for storage while others market their fish here as well. The administrator reported that there was only one bona fide fisher in the association—one of the two who sells all his fish to him.

All of the fishers have their own boats and the administrator reported them to be in "more or less good condition." The place is enclosed by a chain link fence, and they repair vessels here. They fish primarily with *cordel*, for pelagic species such as *sierra*, and with traps for snapper and, at times, lobster. Some of them fish with beach seines, catching second class fish. He said that fishers fish all of the areas that are closed seasonally, including Boya 6, Bajo de Sico, Abrir la Sierra, and Tourmaline, though he didn't say they fished them when they were closed.

They sell most of their fish "al detalle"—retail, but the fish they can't sell they tell to a local supermarket and fish dealers from as far away as Lajas and Aguadilla. Other fishers in the association have their own buyers, independent of him or his.

Mayagüez to Joyuda

Outside of the urban reach of Mayagüez, along the road to Joyuda, there are two small landing centers where fishers keep a few vessels along with small, primitive fish cleaning areas composed of no more than a wooden or metal table and some stools. Generally these places see little activity during most of the week, indicating that these are part-time fishers. Fishers who use these facilities bring their own scales to weigh the fish, selling them to passersby, usually on the weekends.

Also on the outskirts of Mayagüez there is a Club Nautico. On some weekend days it becomes highly active with sports such as volleyball and people parked thickly around its facilities, up and down the *carretera* (highway). Though they are a recreational club, they have a sign that reads *Se Vende Pesca* in large letters on its side. This is an active spot on the weekends, its bar quite popular.

Finally, in Joyuda, in addition to a long line of seafood restaurants, a fisher sells conch shells that are decorated with various images, including that of the Virgen del Carmen. The vendor, who

spent 30 years in the U.S., said that he bought the shells from divers who free dive in 30 to 40 feet of water.

Results from the Fishery Census in Mayagüez

Only 48 fishers responded to the fishers in Mayagüez. As in other municipalities, this is an undercount and likely does not include those fishers who launch their vessels from the small, unaffiliated landing centers south of the urban area. The majority of those interviewed for the census reported being affiliated with an association, and nearly a third are either full-time fishers or fish more than 40 hours per week. In this municipality, fishing part-time, a characteristic of two-thirds of those surveyed, may be related to the variety of alternative occupational opportunities that a bustling urban environment provides.

Table WM.2. Selected Fisher Characteristics, Mayagüez (n=48)

Variable	Response
Association Member	79.2
Hours used for Fishing	
< 20 hours	16.7%
20 – 30 hours	35.4%
31 – 39 hours	16.7%
40 hours	12.5%
> 40 hours	19.7%
Mean hours	32.02
Standard Deviation	15.877
Minimum hours	0
Maximum hours	72

Source: Puerto Rican Census of Fishers, 2002

Table WM.3 shows the most common fishing locations and styles in the municipality. Like many west coast fishers, these take advantage of the productive reefs off the coast as well as the deep water snappers in the Mona Passage. That comparably few fishers fish from shore indicates that most have access to vessels of one sort or another.

Table WM.3. Fishing Locations and Types, Mayagüez (n=48)

Variable	Percent
Shore	6.3
Continental Shelf	56.3
Shelf Edge	58.3
Oceanic	27.1
Reef Fishes	81.3
SCUBA Diving	4.2
Skin Diving	0
Pelagic	22.9
Bait	20.8
Deep Water Snappers	35.4

We discussed marketing in the above narrative, mentioning that many fishers in Mayagüez sell their fish retail, with the associations evidently a less suitable market for many. The census figures support this, with street vending ("walking") the most popular.

Table WM.4. Marketing Outlets, Mayagüez (n=48)

Variable	Percent
Private	0
Fish Buyer	12.5
Association	35.4
Walking	47.9
Restaurant	2.1
Own Business	8.3
Gutted	64.6
Ice	68.8
None	22.9

Again, similar to the other fisheries of the west-northwest part of the island, lines seem to be the most ubiquitous gear, with nets, traps, and SCUBA equipment somewhat rarer.

Table WM.5. Gear Utilized in Mayagüez (n=48)

Variable	Percent
Beach Seine	10.4
Trammel Net	4.2
Long Line	52.1
Troll Line	6.3
Fish Trap	19.7
Gill Net	6.3
Cast Net	43.7
Hand Line	91.7
Rod and Reel	12.5
Lobster trap	0
Snapper Reel	8.4
Winch	8.3
Skin	0
Spear	14.6
Lace	16.7
SCUBA	12.5
Gaff	33.3
Basket	0

Finally, regarding their opinions about the status of fisheries, the vast majority of those interviewed believe the fishers are worse today than previously, with pollution as the principal problem.

Table WM.6. Opinions of Mayagüez Fishers (n=48)

Variable	Percent
Status of Fishery Resources	
Better	2.1
Same	12.5
Worse	85.4
Source of Problems	
Pollution	39.6
Habitat Destruction	14.6
Overfishing	27.1
Government regulations	12.8
Weather	4.2

Variable	Percent
Crowding	14.7
Other (imports, technology, gear)	6.3

Añasco

North of Mayagüez, Añasco is home to a small fishing association called *Tres Hermanos* (Three Brothers) that adjoins a long public beach—*balneario*—that has been, more or less, closed to the public, although the public still has access through the associaton's entrance. Subsistence, recreational, and commercial fishers use this association's ramp and adjacent wooden pier, taking advantage of the facilities and calm waters off the beach. Tres Hermanos, part of the community of La Playa, is the only landing center in the municipality, and though 34 fishers reported to the fishing census from Añasco (more than from Aguada), its landings ranked 26th out of the municipalities that report landings.

Table WM.7. Añasco Demographic Data

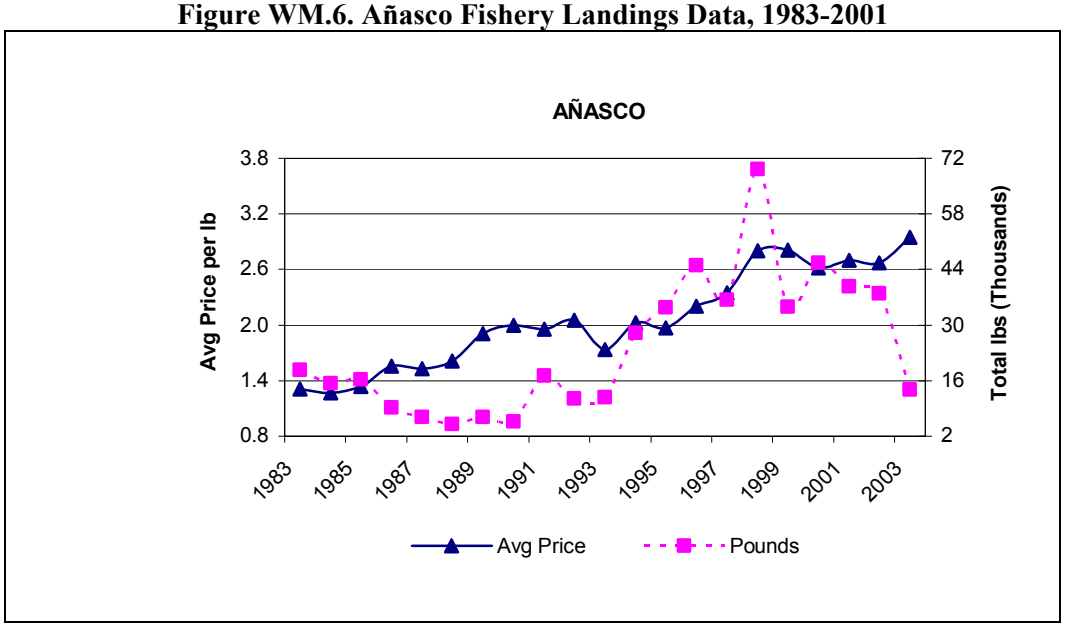
AÑASCO	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	17,235	17,200	19,416	23,274	25,234	28,348
Civilian Labor Force (CLF) [2]	5,472	4,176	4,758	6,508	9,056	8,922
CLF - Employed	5,363	4,044	4,425	5,696	7,269	6,808
CLF - Unemployed	109	132	333	812	1,787	2,114
Percent of unemployed persons	1.99	3.16	7.00	12.48	19.73	23.69
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		1,952	747	420	364	142
Construction		248	475	453	474	706
Manufacturing		1,024	1,580	2,283	3,256	2,173
Retail trade		284	416	575	746	541
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	N/A	18.9	24.7
Persons who work in area of residence [6]		2,948	2,074	2,506	3,978	3,214
Per capita Income (dollars) [7]			641	1,711	3,289	6,613
Median Household Income (dollars) [8]		615	2,050	5,199	8,776	12,620
Individuals below poverty level [9]			14,776	15,260	15,531	14,611
Percent of Individuals below poverty level			76.10	65.57	61.55	51.54

Despite bordering the major western metropolitan area of Mayagüez, Añasco's economic profile has not benefited from this proximity. In terms of population, it is a smaller municipality than either Aguada to the north or Mayagüez to the south, and its unemployment rate is slightly higher (though likely not significantly so) than either of its neighbors. Like the other municipalities thus far profiled, its poverty rate, though high, has declined even as its unemployment rate has increased.

One of the fishers we interviewed at Tres Hermanos was a man who had suffered from depression that he attributed to his work at a local pharmaceutical firm, and he found that fishing offered him therapy for his condition (see Griffith & Valdés Pizzini 2002: Chapter 5 for discussion of fishing as therapy in Puerto Rico). He was an elderly man who fished with his adult daughter, primarily

for recreational and subsistence, and they fished with hand lines from the shore at Tres Hermanos. It is unlikely, of course, that fish from people such as this are included in the landings data, which has declined steadily over the past five years.

Figure WM.6. Añasco Fishery Landings Data, 1983-2001



Average fish prices in Añasco have risen over the past 20 years, particularly during the 1990s, but not always in response to fish supplies. In general, they are less sensitive to fluctuations in supplies than prices in many of the other municipalities (correlation coefficient = .6475). However, average prices reported are higher than in neighboring Aguada, $2.94 compared to $1.64, which may suggest that Añasco fishers are selling a more limited range of fish, targeting only first class species for sale and keeping the remainder for home use. Our interviews in Tres Hermanos did suggest that about half of the 20 fishers that belong to the associations are casual, part-time fishers. One of the part-time fishers we interviewed, for example, only fished for crabs during the month of March, works other jobs (*chiripas*, which are temporary jobs, often in the construction industry) for three months while the season closes and the crabs burrow in the mud, and then takes up crabbing again in October. He sells he catch directly to businesses that also import crabs from Venezuela when they are not available locally.

Añasco History

As the site of Taino settlements prior to the arrival of Europeans, Añasco had scattered populations of Taino and Europeans from as early as the late 18th century. Several of these residents founded the city of Añasco in 1733 with livelihoods based on the common agricultural products throughout the region, raising livestock, and engaging in contraband trade with the English and the French. By the 1770s, Añasco had a population of more than 3,000, including an infantry and calvary, in part because of the ease with which smuggling could be accomplished along its coast.

Añasco's geography stalled its early development. Wetlands, rivers, and lakes surrounded the plain on which the principal city had been built, and rain and flooding were common. During the early 19th century, the population grew slowly, to around 10,000 people, between 5% and 10% of them enslaved. The wet environment, however, may have made the cholera epidemic of the mid-

1850s more devastating here than elsewhere, and Añasco's population was particularly hard hit. By the end of the century its population had grown to only between 13,000 and 14,000 souls. During the 20th century, Añasco's growth was again stifled by the growth of neighboring Mayagüez, which siphoned off its population. Toro Sugrañes suggests that during the first half of the 20th century Añasco increasingly became a dependent satellite of Mayagüez (1995: 40).

The people of Añasco did manage to found at least four sugar mills and export sugar and rum, along with becoming known for the production of livestock. These products dominated the economy until the mid-20th century, after which Añasco became more of a commercial-industrial center, with 17 factories, many dealing in textiles as well as medical supplies, employing over 2,500 people. With the transformations taking place in the textile industry around the world, however, Añasco suffered increasing unemployment and poverty, its residents scrambling for *chiripas* (odd jobs) and migrating to the mainland United States.

Tres Hermanos, Barrio La Playa

Tres Hermanos is part of a larger community called La Playa, whose members operate several small businesses and other organizations nearby the fishing association, including a 7th day Aventis Church, two bakeries (*panaderías*), a small grocery store (*colmado*), rental apartments (some of which are rented to students at UPR in Mayagüez), a gas station, a school, a laboratory, and two beauty shops. Further south along the shore from Tres Hermanos is another small area called El Puente (the bridge), which approaches a river that bears the same name as the municipality. This area is characterized by a few large summer houses, another *colmado,* a Club Náutico founded in 1993 that rents out its facilities, trailers, and a small cluster of wooden buildings that also rent to tourists or others. Together, Tres Hermanos and El Puente collect together the bulk of Añasco's coastal population.

The decline in sugar cane production, local fishers commented, has altered the water quality and species mix in the area, altering the gear fishers use. During an earlier time, they used to fish with *chinchorros* (beach seines) at the mouth of the river and further upstream, but the grasses have grown so thickly that this is no longer possible. Some of these fishers have since switched to traps, though neither traps nor seines are the most common gear in the municipality, according to the census, but various kinds of lines.

Figure WM.7. Lockers at Añasco *Villa Pesquera*

We received conflicting reports on the number of active fishers in the fishing association in Añasco. Fishers we interviewed as they were socializing at the site claimed that there were 10 active fishers and a total of 20 members, but others in the association administration claimed that "actually, only four fishermen sell to this [association] fish market" (*"Actualmente solo cuatro pescadores le venden a esta pesquería"*), out of a total of 14 members. Whether ten or four, the fishers who sell there sell primarily snapper, snook, and lobster; these fishers tend to be younger than the less active ones, in their early twenties, although they do not constitute the only people who fish from this location. Those we interviewed said that people pull boats from as far away as Cabo Rojo and Rincón because the ramp and the large parking area can accommodate several trailered vessels.

Table WM.8. Gear Utilized in Añasco (n=34)

Variable	Percent
Beach Seine	14.7
Trammel Net	20.6
Long Line	11.8
Troll Line	26.5
Fish Trap	14.7
Gill Net	17.6
Cast Net	26.5
Hand Line	67.6
Rod and Reel	14.7
Lobster trap	0
Snapper Reel	61.8
Winch	8.8
Skin	0
Spear	2.9
Lace	0
SCUBA	0
Gaff	64.7
Basket	0

We mentioned earlier that Tres Hermanos, bordering a public beach, was equipped with facilities used by commercial, subsistence, and recreational fishers. In addition to the ramp and pier, the association's facilities include metal lockers and a small boat storage area. The lockers are quite distinct from those of other associations, built with wood and corrugated metal, making the area look less well funded than facilities at associations such as Crash Boat. This could reflect a lack of political prowess on the part of members of the Tres Hermanos association, and those we interviewed there did suggest that the association was in a weakened state. Fisher census data do show that nearly two-thirds (64.6%) of the fishers included in the census devoted fewer than forty hours to fishing. This figure is probably more meaningful in terms of Añasco fishers than the mean figure, in that a few fishers reported fishing over 100 hours per week. These could, we believe, very well be coding errors. If we take out the fishers who reported excessive hours, the mean falls to 33.29 hours per week, confirming local reports of the relative inactivity of many fishers in Añasaco.

Table WM.9. Selected Fisher Characteristics, Añasco (n=34)

Variable	Response
Association Member	52.9%
Hours used for Fishing	
< 20 hours	5.9%
20 – 30 hours	32.3%
31 – 39 hours	26.4%
40 hours	11.8%
> 40 hours	23.5%
Mean hours	40.65
Standard Deviation	26.168
Minimum hours	14
Maximum hours	140

Source: Puerto Rican Census of Fishers, 2002.

Fishers in Añasco fish a variety of locations and utilize a range of marketing techniques, as the following tables show. Fishers in Añasco mentioned fishing in Tourmaline and La Corona.

Table WM.10. Fishing Locations and Types, Añasco (n=34)

Variable	Percent
Shore	20.6
Continental Shelf	17.6
Shelf Edge	55.9
Oceanic	64.7
Reef Fishes	55.9
SCUBA Diving	0
Skin Diving	0
Pelagic	23.5
Bait	41.2
Deep Water Snappers	67.6

Table WM.11. Marketing Outlets, Añasco (n=34)

Variable	Percent
Private	0
Fish Buyer	5.9
Association	73.5
Walking	23.5
Restaurant	2.9
Own Business	0
Gutted	88.2
Ice	79.4
None	14.7

It is interesting that 73.5% (25 individuals) reported selling to the association, when people familiar with the association administration claimed that only 4 fishers sold there. This discrepancy may derive from the fact that some sell to the association regularly while many of those included in the census may sell infrequently to them. The census data suggest that this is the most common method fishers use, yet it would include casual or irregular sales as well as those that sell more frequently, followed by those who sell their catches in the street.

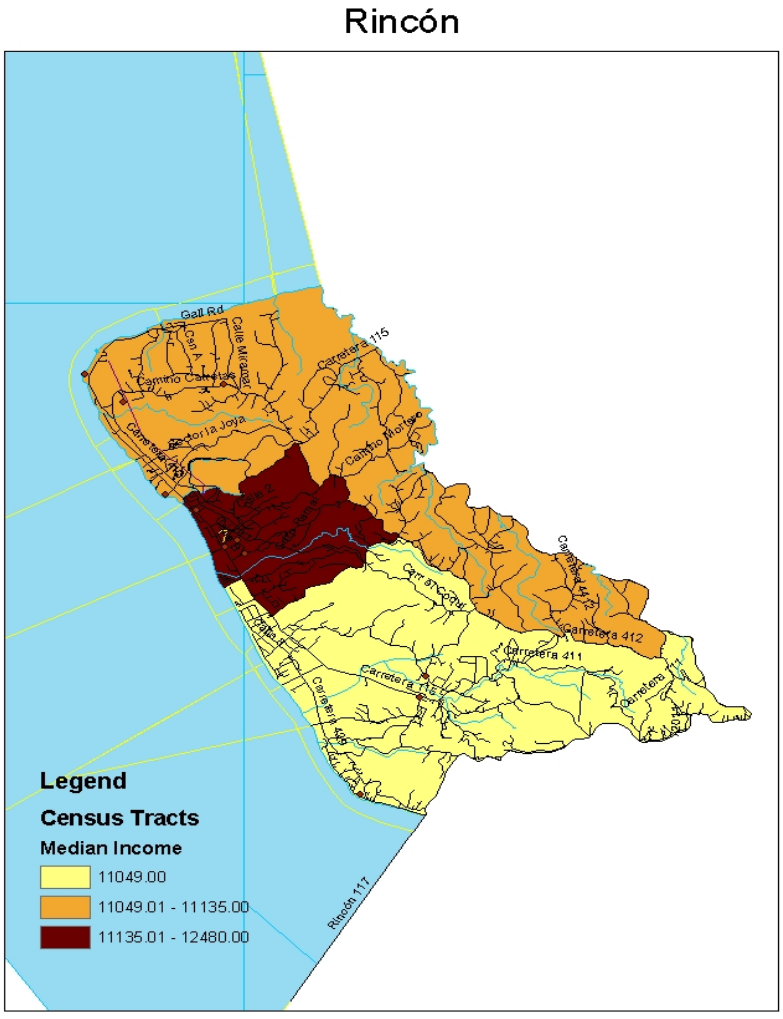
The mixed reports these different sources of information send may be indicative of a declining association or a site that is changing from a commercial fishing site to one that combines commercial, recreational, and subsistence fishing with other kinds of seasonal activities. Others we interviewed in Añasco said that the location was becoming increasingly popular as a recreational site, and that some of the fishers had entered the tourist trade by taking tourists to La Mona. There are a few seafood restaurants in the area which are popular at certain times of the year (mostly during the summer), and the presence of so many rental and summer houses and other facilities, including the public beach, may indicate that Añasco is gradually becoming more of a recreational site. Local officials, clearly, have promoted the area as such, with the "Balneario y área de Remolques Parque Nacional Tres Hermanos" (the official name for the balneario that adjoins the association), a project advertised to have cost over $2,000,000 that will create employment for 30 individuals.

Two features of Añasco fisheries predict that current closures and the MPA at La Mona may have negative effects on those families, between 4 and 25, who rely on commercial fishing and related activities for all or part of their income: the fact that Tourmaline was listed as one of the fishing destinations and that fishers entering the tourist industry are taking tourists to La Mona, recently designated an MPA. While we do not know whether or not fishers are fishing in Tourmaline during the closed season, it is not unlikely that fishers taking tourists to La Mona may be tempted to fish as informal charter or party boats, given the high value placed on Caribbean seafood and fishing among many tourists. Despite future problems developing between Añasco fishers and regulators, comparatively few saw the government as a source of problems:

Table WM.12. Opinions of Añasco fishers (n=34)

Variable	Percent
Status of Fishery Resources	
Same	32.4
Worse	67.6
Source of Problems	
Pollution	50
Habitat Destruction	17.6
Overfishing	20.6
Government regulations	2.9
Weather	2.9

Map WM.2. Rincón



Rincón

Situated far out on the northwest coast, Rincón is probably better known as a surfing location than as a fishing location, despite that it ranked high in landings and in the dependency index. It is also noteworthy that, currently, the fishers of Rincón are among the most innovative on the island. One of its association members brings to the fishers of Rincón his experience as a member of the Caribbean Fishery Management Council, and the current growth trajectory of this fishery promises to place the fishers of Rincón among the most professional and successful in Puerto Rico.

Table WM.13. Rincón Demographic Data

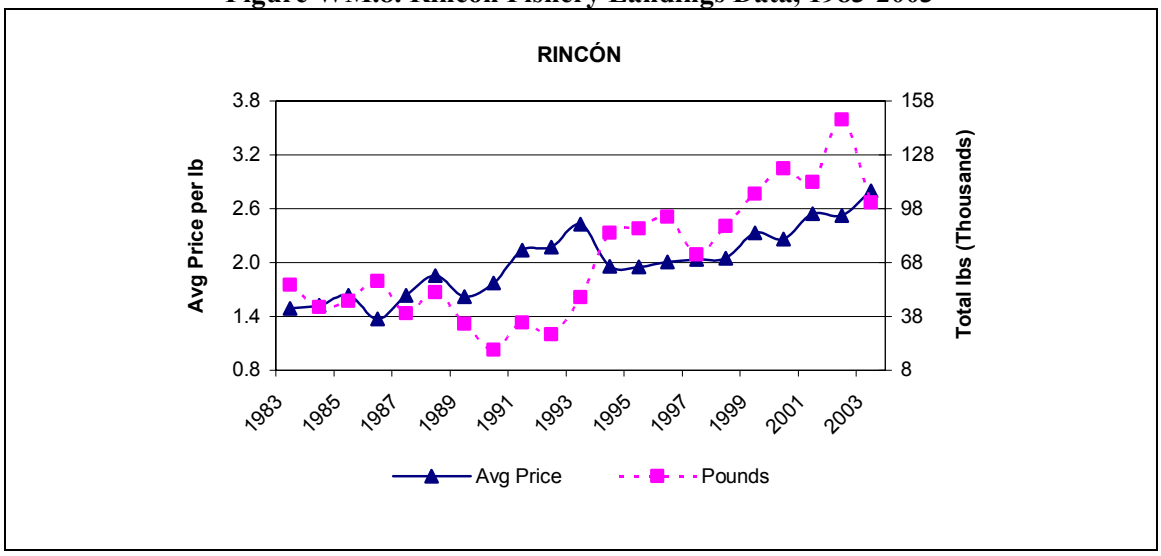
RINCÓN	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	9,888	8,706	9,094	11,788	12,213	14,767
Civilian Labor Force (CLF) [2]	3,100	1,924	2,222	2,918	4,125	4,321
CLF - Employed	3,073	1,852	2,156	2,251	3,277	3,372
CLF - Unemployed	27	72	66	667	848	949
Percent of unemployed persons	0.87	3.74	2.97	22.86	20.56	21.96
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		956	405	100	80	58
Construction		96	245	180	363	394
Manufacturing		308	720	758	916	607
Retail trade		168	185	279	381	353
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	N/A	20.1	25.2
Persons who work in area of residence [6]		1,520	1,461	1,299	1,956	1,627
Per capita Income (dollars) [7]			570	1,323	3,166	6,610
Median Household Income (dollars) [8]		598	1,451	3,277	7,293	11,460
Individuals below poverty level [9]			7,549	9,071	8,483	8,301
Percent of Individuals below poverty level			83.01	76.95	69.46	56.21

In both physical size and population, Rincón is a small municipality, currently highly desired as a place of residence by some of Puerto Rico's wealthiest and most famous citizens. Over the past decade, Rincón has been the site of several coastal real estate development projects, underwriting the gradual increase in construction employment and creating a high demand for sand. The mining of sand from former sugar cane fields is occurring today, yet in the past the mining of sand from marine and littoral locations created problems for what was formerly one of Rincón's most heavily used marinas. Beyond employment associated with construction, all other sectors presented above have been losing jobs, and most of the few still involved in agriculture, forestry, fishing, and mining are likely the fishers of Rincón.

As just noted, Rincón ranked 8th in landings and 6th in revenues, although its 2003 landings were less than half of the leader's, 101, 388 compared to 233,934. Landings reached their high of over 157,000 in 2002 after a gradual rise over the previous two decades. Price has risen since the late 1990s as well, although not in relation to supply (correlation coefficient = .6232). In 2006, however, prices rose to as high as $3.50 per pound. The gradual increase in landings in Rincón is likely due to two factors: the growing recognition among enlightened fishers there that reporting landings is becoming increasingly important in fisheries management decisions; and increasing

fishing effort, in part in response to declines in fishing in its principal competitor, Puerto Real. This history is relevant here.

Figure WM.8. Rincón Fishery Landings Data, 1983-2003



Brief History of Decline of Puerto Real Fishers and its Relevance to Rincón

Up until around 1992, the fishers of Puerto Real would fish all over the Caribbean and were landing their fish in Puerto Rican ports, thus inflating the landings data. They would spend up to three weeks at sea, fishing off of Haiti, the Dominican Republic, and others' waters (Valdés Pizzini 1985). They continued this until the formation of the EEZ, which initiated the process of barring fishers from one nation fishing in the waters of other nations. Once countries like Haiti and the Dominican Republic had their EEZs in place, they began arresting and jailing Cabo Rojo fishers who still fished in their waters, which led them to alter their patterns of fishing and livelihood. Today Cabo Rojo fishers fish near-shore and shallow waters, as well as take hunters to La Mona and then fish around Mona while the hunters camp. Fishers in Rincón have begun to fish the waters off their coast, where Cabo Rojo fishers used to fish more heavily.

Figure WM.9. Floats and Detachable Spools with Hooks used by Rincón Fishers

Rincón History

Certainly every Rincón school child learns that Columbus stepped foot on the shores of this municipality the 19th of November, 1493, just south of Cabo de San Francisco. Its first town was located near this spot, close to the sea, only 30 feet above sea level, where the central town of Rincón remains today. Columbus' early acquaintance with this part of Puerto Rico marked it for early colonization by the Spanish, along with the entire western coast, its importance bolstered by the fact that it faced Spain's most important Caribbean territory: *La Española* (Hispañola, today's Dominican Republic and Haiti). The area had a permanent Spanish settled population as early as 1590, though at the time Rincón was part of the larger administrative unit Aguada (today its northern neighbor). Not until 1770 did Rincón separate from Aguada as its own municipality, and only after Añasco in 1728 and Mayagüez in 1760. Six years after its founding a passing historian described it as populated by 1,130 poor, desperate people living (presumably in huts or other temporary structures) among 11 more permanent dwellings and a small church. By the 1820s, however, it had grown to over 4,200 people, but increased to only around 6,600 by the end of the 19th century.

In addition to sugar, which dominated the economy from the early 19th century until the mid-20th, Rincón's people cultivated tobacco, corn, rice, bananas, and chocolate. Toro Sugrañes reports that growing fruit and fishing were also principal activities in Rincón, suggesting perhaps that fishing was among those activities that subsidized labor for work in agriculture, whether on small farms or larger haciendas and plantations.

As with many other municipalities, Rincón, in poor economic condition, was annexed by Añasco in 1902, but regained control of its territory two years later. In 1918, a devastating tsunami left Rincón one of the hardest hit coastal municipalities, taking its main church and several of its oldest public and private buildings. As Rincón moved away from dependence on agriculture through the latter part of the 20th century, tourism, which fishing and the raising of fruit both fed, became an increasingly powerful force in the local economy. Tourism and the construction of luxury, seaside homes has been central to the economic condition of Rincón in recent years, with former sugar properties now being mined for sand for the construction industry.

Fishing in Rincón

Thirty-five fishers responded to the fisher census in Rincón. Their responses paint a portrait of the fishery that seemed to correspond, roughly, to what respondents interviewed during the ethnographic phase of the project told us. They comprise a serious, dedicated fishery, with two-thirds of its fishers fishing full-time and few fishing fewer than 20 hours per week. The following tables show them to be primarily oceanic fishers, using lines and some traps. The only divergence between the census data and the ethnographic information concerns their marketing behavior. The census data suggests that private buyers are more important than associations in Rincón, but those interviewed there suggest that the association as a marketing facility is becoming more and more important all the time.

Table WM.14. Selected Fisher Characteristics, Rincón (n=35)

Variable	Response
Association Member	60%
Hours used for Fishing	
< 20 hours	8.6%
20 – 30 hours	17.1%
31 – 39 hours	8.6%
40 hours	31.4%
> 40 hours	34.3%
Mean hours	40.31
Standard Deviation	13.385
Minimum hours	15
Maximum hours	72

Source: Puerto Rican Census of Fishers, 2002

Table WM.15. Fishing Locations and Types, Rincón (n=35)

Variable	Percent
Shore	17.1
Continental Shelf	25.7
Shelf Edge	17.1
Oceanic	82.9
Reef Fishes	34.3
SCUBA Diving	14.3
Skin Diving	8.6
Pelagic	22.9
Bait	40
Deep Water Snappers	77.1

Table WM.16. Gear Utilized in Rincón (n=35)

Variable	Percent
Beach Seine	8.6
Trammel Net	8.6
Long Line	17.1
Troll Line	34.3
Fish Trap	28.6
Gill Net	11.4
Cast Net	31.4
Hand Line	68.6
Rod and Reel	20
Lobster trap	0
Snapper Reel	25.7
Winch	28.6
Skin	0
Spear	8.6
Lace	8.6
SCUBA	20
Gaff	45.7
Basket	2.9

Table WM.17. Marketing Behaviors, Rincón (n=35)

Variable	Percent
Private	0
Fish Buyer	77.1
Association	2.9
Walking	14.3
Restaurant	14.3
Own Business	2.9
Gutted	71.4
Ice	77.1
None	17.1

Table WM.18. Opinions of Rincón Fishers (n=35)

Variable	Percent
Status of Fishery Resources	
Better	11.5
Same	34.3
Worse	54.3
Source of Problems	
Pollution	31.4
Habitat Destruction	5.7
Overfishing	22.9
Government regulations	17.4
Weather	5.8
Coastal Development	5.7

According to nautical charts, the waters off Rincón drop off relatively quickly. Rincón fishers fish a corridor from the shore to La Mona, passing Desecheo, which is nearly all deep water. Here they catch mostly highly prized, deep water snapper and grouper species, although during

some times of the year they long-line with spool rigs that a man who lives across from the Club Nautico makes for the association.

Fishers in Rincón are highly cooperative. Each Rincón fisher brings to the fishery different skills, which they pool to help one another. They also help one another if one of them needs money for an immediate family problem. In addition, with other fishers in other municipalities, they will sometimes barter for bait if they have more fish than they can sell, and they routinely give small fish away in the community, enhancing their local reputation and further ingratiating themselves with the municipality's power structure.

There are two fisher "unions" or associations in Rincón, one with 15 captains and another with 10 captains, each of which takes an additional crewmember, for a total of 50 full-time fishers. There are an additional 10 fishers who specialized in lobster. All of the full-time fishers sell their fish through the association, which in turn provides it to the elegant local seafood places across the west coast, including Cabo Rojo's Las Brisas, in Puerto Real. The community, in turn, has been good to them, supporting them by buying modern boats and letting them use them with a number of conditions attached, including keeping them in good shape, using them conscientiously for fishing (as opposed to drug running), and making sure they record all their landings.

Figure WM.10. Municipality-Provided Boat in Rincón
(note MU on license, indicating it belongs to the municipio)

These vessels are evidence of their continuing attempts to "professionalize" the fishery. As further evidence, leaders reported that record-keeping is important to them, in that it enables them

to legitimize the fishery and to use the records as "tools" to access loans and other benefits, including the Bona Fide program. The Villa Pesquera itself is run like a corporation, keeping accurate records and issuing checks (as opposed to cash) to member fishers for their catch. Despite this, some fishers, evidently, fear the records because they believe they will lose some form of public assistance, or pay higher taxes, which is problematic, but some Rincón fishers, nevertheless, believe the advantages to record-keeping outweigh the costs.

Another dimension of the professional attitude of Rincón fishers is their emphasis on supplying high quality seafood to local restaurants—interestingly, a central point in Jarvis's 1930s study of Puerto Rican fisheries. According to them, many of the Rincón hotels buy imported, less succulent fish, caring less about return customers to their restaurants and concentrating on service (and value) from renting rooms. By contrast, local seafood places use only fresh local fish and thrive only if they have consistent quality and return business. It is these restaurants that add to the charm of Puerto Rico's coast, too, and have become a cornerstone of business. Fishers in Rincón estimate that upwards of 90% of fish from the association leaves the municipality.

Not all fishers in Rincón are associated with one of the two active associations. There are fishers who fish for dealers in other municipalities, but this is usually done by part-time fishers, and irregularly. Generally, these individuals are less concerned with supplying quality seafood to their markets.

Most of the association fishers, though not all, live in a single parcela—Parcela Estela—which is adjacent to the waterfront. With a few exceptions most of them have moved away from the actual waterfront, either selling out to wealthy people or renting their beach properties to others. The smart ones are staying, though the wealthy don't particularly like it. "We have a saying," an association leader said: "They like the bird cage, they just don't like the birds." *("Les gusta la jaula, pero no les gusta las aves.")*

There is, indeed, much gentrification in Rincón, along with many big and well-financed construction projects. A Heinz mansion and grounds had just sold for over $3,000,000, purchased by Colombians, and the same people were building two huge high-rise condos and had plans to surround the mansion with small villas. A few famous people stay here (Steve Forbes, for example, as well as several Hollywood stars). Many mainland Americans who bought places on the waterfront have turned them into guesthouses. Of course, the attraction of Rincón to surfers lends the municipality and its residents another dimension—younger, less obviously wealthy, active, with a rich night life of beaches and bars.

One of the interesting aspects of the gentrification is that the construction has created a demand for sand, which the companies that used to own the sugar *centrales* are now mining and selling to the contractors. The demand for sand also caused the marina owner to dredge out sand from near his marina for sale, causing a pile up that clogged the entrance and made the marina unusable.

At the main Rincón association, the time we visited, the freezers contained bait fish, a few pelagics, and some snapper. Fishers here can make up to $1,000 per day in fish sales, which is good for the local economy, but (due to seasonal fluctuations) typically they make an average of around $20,000 per year, contributing as much as $500,000 to the local economy. The association also has a little chapel where they keep the Virgen. They take her out onto the water for the July celebration.

Figure WM.11. Pelagics in Rincón Association Freezer

Figure WM.12. Snapper in Rincón Association Freezer

One of the Rincón fishers' principal gripes is with recreational fishers. According to them, there are, at most, 2,500 commercial fishers on the island (this is probably an overestimate), but 100 times that many (250,000) recreational fishers, who are responsible for half the catch. They've been working to get bag limits on several species, which they have and are already too high.

Currently, there have recreational bag limits on: Mahi (Dorado), Kingfish (sierra), and Wahoo. Recreational fishers are allowed 5 fish apiece, but Rincón fishers believe this is still too high. This is particularly troubling because, with superior boats and seemingly endless amounts of

cash, sport fishers can catch a good amount of fish that they don't need. Instead, they sometimes sell it to local restaurant owners just to cover their trip expenses, essentially dumping it on the market for around a dollar per pound. In the words of one of their more prominent members:

"Market Destruction is just as bad as Habitat Destruction."

Concerning the fishing, they vary through the year depending on the character of the sea. When they can, they bottom fish, but the seas have to be calm. When they are rougher, they deploy the long line spools pictured in WM.6. earlier. The spools are detachable from the winches for this.

They rise earlier in the morning during hurricane season, leaving from the shore around 3:00 in the morning because the seas are calm and they need to fish closer in, to stay closer to shore and (usually) return earlier. The ramp is also a problem, and the municipality is currently trying to open a new marina, in part for the fishers of Rincón. This suggests that the municipality leaders view them as an important component of their community.

They abide by several vedas to allow spawning:

- December to March 1st, Red Hind
- March & April, No grouper
- April-May, no Mutton Snapper
- June, Manchengo (Lane snapper)
- July – September, Queen Conch
- October to September, Deep water snapper: vermillion, silk, black, and black wing. This last one has two peak spawning seasons, one of which they negotiated to choose because this one overlapped more with bad weather and rough seas.

To get access to a boat, a young fisher needs to put in years at sea, maybe 10 or 15. This is considered a rite of passage, or a kind of apprenticeship, allowing new fishers into the fishery. Following this, when a new fisher gets his boat (especially one on contract from the municipio), he can use this as a "tool" to access loans and the bona fide program.

There is an environmental spirit among some of the fishers of Rincón, who believe that reef fishing should be a thing of the past. The reefs need to be protected for tourists to look at and enjoy. One of their spokesman also advocates that fishers move from 2-cycle engines to 4-cycle engines, which burn cleaner and with less damage to the water. Along these same lines, the hotels' needs for clean water is actually bad for some environments, because they flush that water into the estuaries and this changes salinity levels and, hence, the species mix. This is particularly bad in eastern Puerto Rico, where the water is so shallow and the problem is exacerbated by the growth in marinas. Marinas create a major boating traffic problem for fishers, including from jet skis, which Rincón fishers see as damaging fish populations from noise pollution.

Figure WM.13. Rincón Villa Pesquera

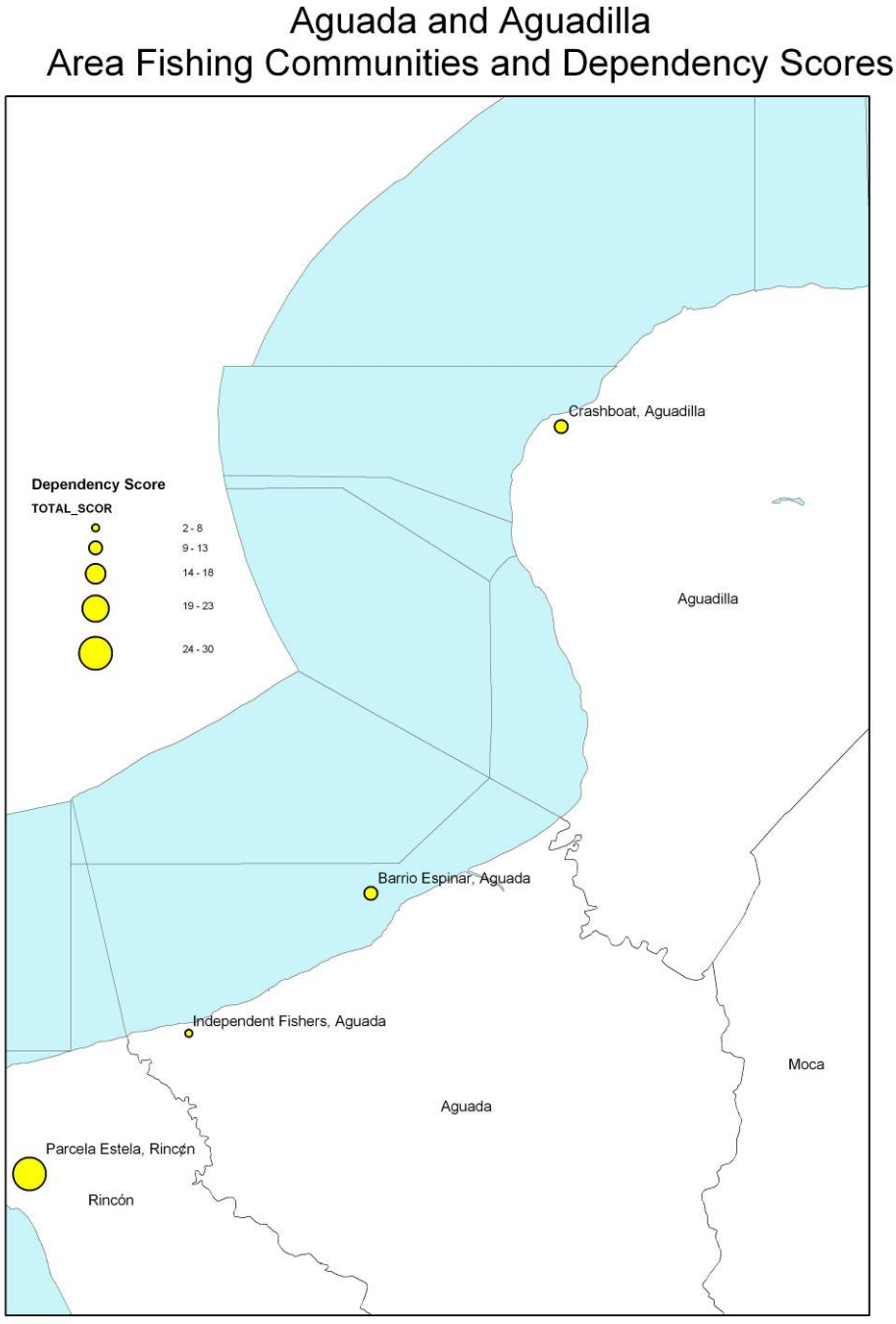
Figure WM.14. Club Naútico of Rincón

Figure WM.15. Ramp at Club Naútico

Northwestern Region:

Aguada and Aguadilla

Map NW.1. Northwest Region



Aguada

Situated between Aguadilla and Rincón, on the northwest coast, Aguada's more than 40,000 residents have experienced changing economic circumstances over the past few decades. Table NW.1 outlines some of these, showing that Aguada's recent economic performance has been mixed.

Table NW.1. Aguada Demographic Data

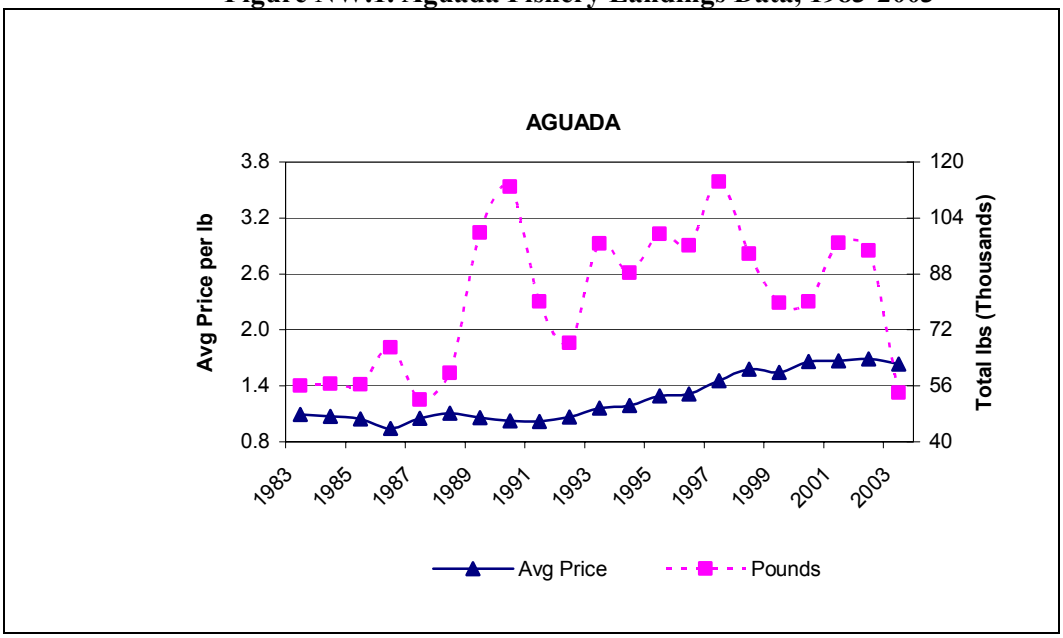
AGUADA	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	20,743	23,234	25,658	31,567	35,911	42,042
Civilian Labor Force (CLF) [2]	6,633	4,648	4,397	7,702	12,092	12,521
CLF - Employed	6,546	4,464	4,132	6,024	9,359	9,755
CLF - Unemployed	87	184	265	1,678	2,733	2,766
Percent of unemployed persons	1.31	3.96	6.03	21.79	22.60	22.09
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		2,040	865	343	303	160
Construction		304	493	604	579	1,018
Manufacturing		788	846	1,929	2,914	2,442
Retail trade		380	529	740	1,535	1,183
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	N/A	17.8	23.6
Persons who work in area of residence [6]		3,636	2,750	3,902	5,323	4,684
Per capita Income (dollars) [7]			524	1,378	2,993	6,100
Median Household Income (dollars) [8]		574	1,535	4,147	7,404	11,384
Individuals below poverty level [9]			21,478	24,175	25,004	24,880
Percent of Individuals below poverty level			83.71	76.58	69.63	59.18

While a smaller proportion of Aguada's population was living below the poverty line in 2000 than in previous decades, the unemployment rate rose from under 2% to over ten times that in the last half of the 20th century. Job losses in agriculture, forestry, and fisheries were especially pronounced. The reduction in poverty with increasing unemployment may be explained, of course, by government transfer payments. The municipality, within commuting distance of Mayagüez, has experienced a doubling of its population since 1950, growing by between 15% and 20% between 1990 and 2000. During the same time, manufacturing jobs declined by 16%, and per capita income rose significantly, by 103%, which may indicate that people are earning incomes from a variety of sources, including informal economic activities, income from working on the mainland (e.g. pensions), or investments. It may also be the case that the increase in construction employment in both absolute and proportional terms contributed to the increase in per capita income. However, this may result from gentrification as well, with more extremely wealthy people moving into the coastal fringe and raising income averages for the whole municipality. In an economic environment sending mixed signals such as these, fishing very likely provides a much needed source of high quality food and sporadic income, and may in fact be among those sources of income for people who are technically unemployed.

Aguada is home to several unlicensed, unaffiliated, and more or less independent fishers who fish part-time, either by themselves or in pairs, as well as one Villa Pesquera whose reach, via marketing and other relations, is extensive. While fishing activity emanating from the municipality is not among the heaviest on the island, data from the census of fishers suggest that

nearly two-thirds of the 24 fishers (62.5%) landing fish at one of Aguada's two fishing centers are full time fishers, and only around 20% fish for 25 hours or fewer per week. Very likely, however, the census count does not include several part-time net fishers we interviewed during our ethnographic work.

Figure NW.1. Aguada Fishery Landings Data, 1983-2003



With its 2003 reported landings of 53,972 pounds, Aguada ranked 15th among 41 municipalities reporting landings that year. Figure NW.1 shows the landings data for the past 20 years in Aguada. These data, coming from two landing centers in the municipality—Espinar, the largest, and Guaniquilla—show that Aguada fishers' commercial landings have fluctuated between a high of nearly 120,000 pounds in 1997 to a low of around half that ten years earlier and in 2003. The most recent data suggest that catches have declined since 1997, yet the decline has not been steady, but fluctuating, with the early years of the 21st century witnessing relatively high catches.

As we will see in all our municipality profiles, price is another story. While price has risen over the 20-year period, from $1.10 to $1.60 per pound, its rise has been more gradual and has not, in all years, mirrored supply. Spikes in price have not matched large contractions in the supply of fish, nor have prices fallen in line with increases in catch (1983-2003 correlation coefficient = .2868). Of course, these conclusions may change over shorter time spans or with larger, island-wide data sets. They may also, however, reflect such factors as seafood imports, which fishers in Puerto Rico, as with fishers everywhere, complain are eating into their ways of life.

Brief History of Aguada and Aguadilla

Although some historians (as well as Aguadilla residents) dispute this, Aguada shares with Rincón and a few other locations around Puerto Rico the supposed honor of being one place that Columbus landed when he "discovered" Puerto Rico. In 1893, when Aguada was celebrating the four-hundredth anniversary of its discovery, they erected a cross in barrio Espinar, which Aguadilla claimed as part of its territory.

In any case, Columbus wasn't the first to see the territory, of course. Aguada was settled by Taino long before Columbus, but it was nevertheless one of the first places in Puerto Rico colonized by Europeans. The first large livestock raising ranch was in Aguada, founded in 1505, and Franciscan priests founded a monastery there only eleven years later, although Taino (or Carib) warriors destroyed it a few years after it was built. The port of Aguada-Aguadilla, according to Toro Sugrañes (1995:21) was the first port the Spanish used to colonize Puerto Rico.

What was originally Aguada was a far larger territory than we see today. At one time Aguada included the neighboring municipalities of Rincón, San Sebastián, Moca, and Aguadilla. It lost these territories between 1752 and 1780, with Aguadilla being the last to break away.

In addition to livestock, Aguada produced flour, coffee, and sugar cane into the 20th century, as well as tropical wood products. Aguadilla produced tobacco and chocolate as well. During the 19th century sugar cane grew to eclipse most other crops, and after Aguada's first mill, La Central Coloso, was opened in 1827, several other, smaller mills started up throughout the region. Coloso was a working sugar mill until 1993. Aguadilla had eight mills. Like other western municipalities, Aguada and Aguadilla suffered great losses of property and life during the 1918 tsunami.

Fishing in Aguada

One of the factors constraining the development of a large and well-developed fishing fleet, similar to that in Aguadilla, seems to be the natural attributes and contours of the coastline. Heavy surf pounds the beaches along the Agauda coast, attracting surfers but making landing fish difficult for fishers. There is a *muelle* or pier near the Espinar association, battered and little used, and there appear to be no highly sheltered bays nearby. According to fisher census data, 45.8% of fishers fish from shore, although this isn't the most common fishing location (see table NW.2):

Table NW.2. Fishing Locations and Styles, Aguada (n=24)

Fishing Location	Percent Reporting
Continental Shelf	87.5
Oceanic	87.5
Reef	87.5
Shore	45.8
Shelf Edge	16.7

Source: Puerto Rican Census of Fishers, 2002
Totals do not add up to 100% because fishers typically fish multiple locations

Figures also show that slightly more than two-thirds of the Aguada fishers included in the census are affiliated with an association, although very likely this is an inflated figure (see table NW.3). A local political official, who supported the fishery in his role as a representative of the people, commented that the fishing association in Aguada existed primarily in name only; fishers were were "well organized," he said, but outside of the association, whose facilities are currently used as a private fish market. In addition, during our ethnographic work, we encountered several independent and unlicensed fishers who were not likely included in the census, which would increase the percentage of unaffiliated fishers, and we never were able to locate fishers affiliated with Aguada's second official landing center, called Guaniquilla. Regarding gear types and species targeted, the census figures coincide, roughly, with reports from our interviews.

Fishers in Aguada tend to fish multiple gears in three categories—lines, nets, and traps (in that order)—and to target both pelagic and deep water species as well as *róbalos* (snook) in the mouth of the Río Corozo. Aguada fishers tend not to dive, however, and though lobster were seen in the local fish markets in Aguada, lobster traps were not listed in the census as a gear used. Well over two-thirds of the Agauda fishers reported to the census that they fish for pelagics (70.8%) and deep water snapper (83.3%), while another 66.7% listed fishing for bait. Lines in general and hand lines in particular are the most common gear used, with 87.5% listing hand lines and others listing long lines (32.3%) and trot lines (25%). We found similar rankings in our ethnographic interviews.

Table NW.3. Selected Fisher Characteristics, Aguada (n=24)

Variable	Response
Association Member	70.8%
Hours used for Fishing	
< 20 hours	16.7%
20 – 30 hours	12.5%
31 – 39 hours	8.4%
40 hours	45.8%
> 40 hours	16.7%
Mean hours	36.76
Standard Deviation	15.294
Minimum hours	10
Maximum hours	80

Source: Puerto Rican Census of Fishers, 2002

Barrio Espinar

Aguada is an interesting case in that it shows that the ties emanating from one association in the municipality, in Espinar, draw on several sources for fish and extend to several areas for markets, creating income and employment for families in a number of neighborhoods spread across at least three municipalities. Accessing supplies from other municipalities may derive from lower and sporadic catches in Aguada compared to other, nearby municipalities such as Aguadilla or Rincon. The association in Espinar sits between the water and a cluster of seafood restaurants on the northwestern edge of the municipality's principal city of Aguada. While the facilities appear similar to other *Villas Pesqueras* (fishing associations) around Puerto Rico, the association is less a cooperative than a private, family-operated fish market. Those considered members consist of those who sell fish regularly to the market.

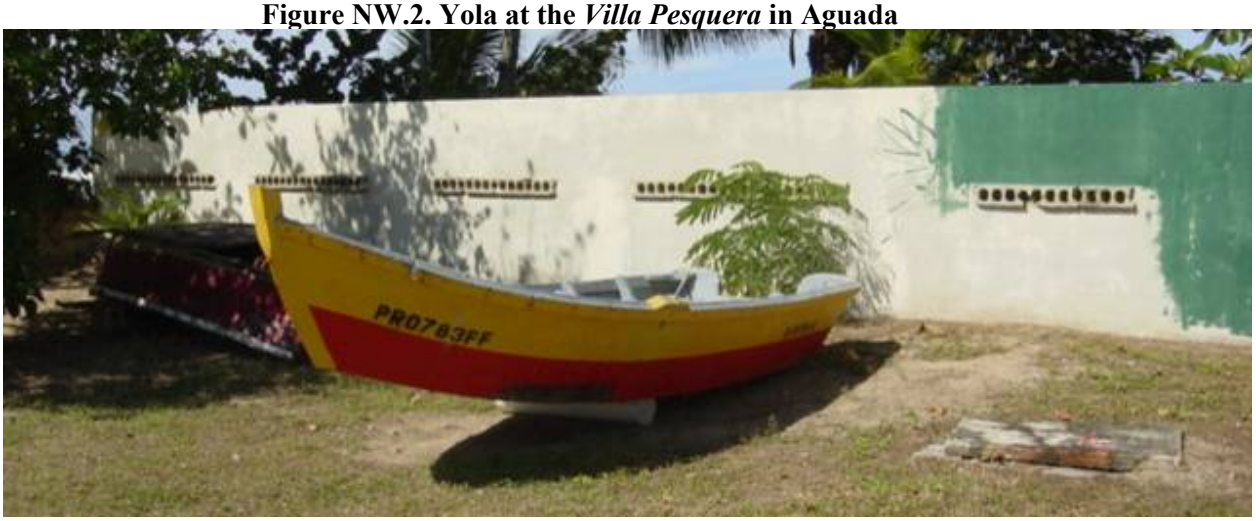
To reach the association, you weave through the main town and cross a bridge until you reach the neighborhood of Espinar, passing at the last through a small cluster of seafood restaurants and markets. The restaurants serve *empanadillas de jueyes* (land crab)*, chapin* (trunkfish), and other fish, as well as kingfish and *ensalada del pulpo* (octopus) or *carrucho* (conch). Only two of the four to five restaurants and *pescaderias* (fish markets) there open during the week; the others open on the weekends. In as much as the neighborhood depends heavily on its seafood restaurants, and the restaurants on its fish market and association facilities, Barrio Espinar is Aguada's fishing community. In addition to its fish market and restaurants, it has a school, bakery, service station, three churches, a Head Start center, and several *colmados* (small food stores). Recreational fishers are seeking to deepen its status as a fishing community by establishing a Club Nautico.

The Villa Pesquera is about two blocks from this area of restaurants. Its thirty members fish all kinds of gear, including nasas (traps), trasmallo (trammel net), cordel (lines), and chinchorro (beach seine). The association president, also the fish merchant, staffs the market on daily basis. He reported that members live in Aguadilla, Aguada, and Mayagüez. There are two freezers in the seafood market, one containing the fruits of the *cordel* (lines): dorado, kingfish, tuna, chillo (silk snapper), and so forth, and another containing the fruits of traps, principally *langosta* (lobster). Fisher census data support that lines constitute the most common gear type in use among Aguada fishers, nets second, but traps and diving equipment restricted to only a handful of fishers (see table NW.4.). That Aguada fishers tend not to use traps may be due to the characteristics of the bottom and wave activity of the western coast, which make it difficult to set and check traps; instead, Aguada fishers target pelagics, such as dorado, by trolling, or deep water reef species, such as snapper, with hand and other lines.

Table NW.4. Gear Used by Aguada Fishers (n=24)

Gear	Percent Using
Hand Lines	87.5
Snapper reel	41.7
Long line	33.3
Rod & Reel	29.2
Troll line	25
Beach Seine	25
Gill Net	25
Fish trap	8.3
Spear	4.2
SCUBA/ diving	4.2
Trammel Net	4.2
Lobster trap	0

Figure NW.2. Yola at the *Villa Pesquera* in Aguada



As just noted, the owner of the fish market, whom we call Benacio, links supplies of fish with consumer markets in ways that entangle several others in his operation. Although there are thirty fishers in the association, only six of those 30, or one out of every five, supply him with fish on a

full-time basis.[9] These fishers fish from large vessels out of Rincón, fishing the Mona Passage and traveling as far as Santo Domingo for snapper and lobster.[10] In addition, fishers from Aguada catch the highly desired kingfish, tuna, and other pelagic species. High seas fishers are not, however, his sole suppliers, nor do they constitute the breadth of his operation. The following lists demonstrate the wide reach of Benacio's ties:

Fish Suppliers

- Six steady, full time fishers from Aguada who fish out of Rincón. These are the fishers who use large vessels ("lanchas," which usually refer to vessels longer than the 18' to 20' *yolas* that are ubiquitous across Puerto Rico). They tend to fish far off shore, traveling as far as the Dominican Republic for lobster and routinely fishing in the deep waters of the Mona Passage for grouper and snapper.
- An additional 21 to 24 fishers from Aguada who sell to him part-time.
- Occasional other fishers from Rincón, El Maní (Mayagüez), and Añasco who sell to him irregularly.

Fish Marketing Outlets

- Three seafood restaurants in Cabo Rojo (about 16 miles to the south).
- One dealer in Isabela (about 10 miles east northeast)
- Various consumers in two locations, Tamarindo and Higuey, Aguadilla (adjacent municipality to the north).
- 1 street vendor who sells for him in Rincón & San Sebastian (neighboring municipalities to the south and east).
- 1 street vendor who sells for him in Aguada (home muncipality).
- 1 street vendor who sells for him in Aguadilla.
- 1 street vendor who sells for him in Dorado (north coast, near San Juan, about 50 miles east).

Thus, at the very least, 47 relationships with individuals or businesses *based on fish or fishery resources* emanate from Bonacio's operation. This doesn't even take into account his suppliers for ice, electricity, freezers, plastic bags, etc. Nor does it include the vendor who sells lunches out of the back of his station wagon in the Association's parking lot. Further, each of these individuals or businesses has their own networks and others with whom they conduct commercial or social transactions. For example, the restaurants in Cabo Rojo have owners, employees, suppliers, and customers. The four street vendors support families. The part-time fishers, as is common across Puerto Rico, very likely have alternative occupations that fishing subsidizes to some degree. The seafood dealers have their own families, the restaurants they supply, and those who supply them with ice, freezers and freezer service, and building space. These multi-stranded relationships enhance those that stem from place-based community resources within the barrio: school, churches, *colmados,* and so forth.

In addition to the fishers who supply Bonacio, there is a small group of net fishers who operate out of the area. These individuals, unaffiliated with the association, are street vendors as well. They haul fish in from the beach, primarily, and sell it from their cars and trucks. The fisher

[9] These figures do not correspond with those of the fisher census. First, this is a smaller proportion of full-time fishers than suggested by the figures in the census, and, second, the census only included 24 fishers from Aguada, while Benacio reports 30 fishers at his association alone. The discrepancy might be due to the fact that Benacio is reporting only on the association, and the census derives from licensing data; in any case, the discrepancy points to the need for groundtruthing the census with ethnographic work.

[10] Later in our fieldwork, a fisher from Rincón disputed the claim that all of these fishers fish full time for this fish market.

census found only a handful of marketing strategies in Aguada, suggesting that most of the secondary marketing to private seafood markets, restaurants, hotels, and other outlets is handled though the association by Bonacio (see table NW.5). It is no mere coincidence that the proportion of fishers who sell to the association is identical to the proportion of fishers who belong to the association: Bonacio suggested that selling to the association is a condition of membership, and that he would learn if members were selling their fish elsewhere. As noted in Volume I, association membership often has several advantages, such as access to lockers, freezers, and other facilities. Evidently, independent fishers sell either to fish and seafood buyers/ dealers or on their own, as reported, out of the backs of their trucks on the street. It is interesting, too, that a minority, likely subsistence fishers, do not sell their fish.

Table NW.5. Marketing and Fish Handling Behaviors, Aguada (n=24)

Marketing Behaviors	Percent Reporting
Fish dealer/ buyer	29.2
Association	70.8
Street vending	12.5
None	8.3
Sell fish gutted	75.0
Keep fish on ice	66.7

Source: Puerto Rican Census of Fishers, 2002

Despite the many relationships formed around the association facilities, Bonacio reported that the association does not really function as a cooperative unit or a fishing community. Instead, its facilities have been more or less privatized, it receives little or no help from the government, and the members who founded it and used to form its core are now all old or dead. This suggests that associations have life cycles based on their membership, with a few strong members necessary to keep the association running as a unit capable of accessing state support and advocating on behalf of fishers.

As noted above, the Villa Pesquera at Espinar is part of a larger neighborhood and commercial district adjacent to a private recreational area near the Rio Culebrinas, along which several wealthy individuals "from outside the community" live, including the owner of one of the largest transportation lines in Western Puerto Rico. In Bonacio's words, *"Estos son personas de chavos."* (These are people of wealth"). There are signs of incipient gentrification: not only has the river attracted the wealthy, but the mayor reported that near the Villa Pesquera they are attempting to locate a Club Nautico. There has been opposition to this project based on the shore's reputation as a manatee haven and as a place where land crabs lay their eggs.

Independent Fishers in Aguada

In addition to Espinar, several independent fishers live and fish out of a *parcela* south of Espinar, just across the street from the beach. The beach has high waves and the fishers here fish from small 18' to 20' foot *yolas*, primarily using beach seines. Four of their boats sit near a small concrete, tiled municipal gazebo while others are in the back yards of fishers. Based on interviews with a small group of these fishers, we determined they are part-timers, unlicensed, and they claimed that Aguada was full of fishers like this. They fish only on the weekends, with beach seines primarily, many men fishing together. They may be some of the same individuals the Bonacio reported, unaffiliated with any association and selling independently. In the back yard of the fisher's house was his fishing equipment (including the *chinchorros*) and boat and a small auto body shop business emitting the common odors of paint and solvents. Four men were standing around, and at least two of them, including the owner of the boat, were working on the

body of a car. They belonged to no association, yet reported they fished together usually on Saturdays. They said that fishing, in general, was bad; one couldn't make a living from it.

Figure NW.3. Vessel in Independent Aguada Fisher's Backyard, with *Chinchorro* (Beach Seine) Drying

Figure NW.4. Independent Aguada Fisher Vessel & *Chinchorro* Near Municipal Gazebo (note rough surf)

In light of these observations, it seems that dependence on fishing in Aguada, for some at least, varies by the days of the week. This is clearly the case with commercial activity in general along the coast. It climbs to bustling, extremely active pitches on weekends but falls to low levels on Mondays and in some cases Tuesday as well, when many of the restaurants close.

Table NW.6. Opinions of Aguada Fishers (n=24)

Opinion	Percent reporting
Status of Fishery Resources	
Better	4.2
The same	29.2
Worse	66.7
Reasons for problems in fisheries	
Pollution	16.4
Habitat Destruction	12.5
Overfishing	8.3
Laws, regulations, and licensing	29.1
Crowding	8.3
Seasonal factors	8.3

Aguadilla

As with Aguada, Aguadilla has experienced a rise in unemployment yet a decrease in persons below the poverty line, suggesting mixed economic performance. The steep (>90%) decline in people employed in agriculture, forestry, and fisheries since 1960 is something the island as a whole has been experiencing; some of the displaced have found work in the growing construction and manufacturing sectors, but manufacturing has suffered losses in recent years after previous tax breaks, the so-called 936 laws, ended. As in Aguada, travel time to work has increased as people either seek more distant jobs or have more difficulty getting from home to work. In one of our open-ended interviews with a worker displaced during a downturn in garment manufacturing, we learned that one of the problems displaced workers face is crossing through dangerous neighborhoods at certain times of the day, which precludes them from taking night jobs or attending night school.

Table NW.7. Aguadilla Census Data

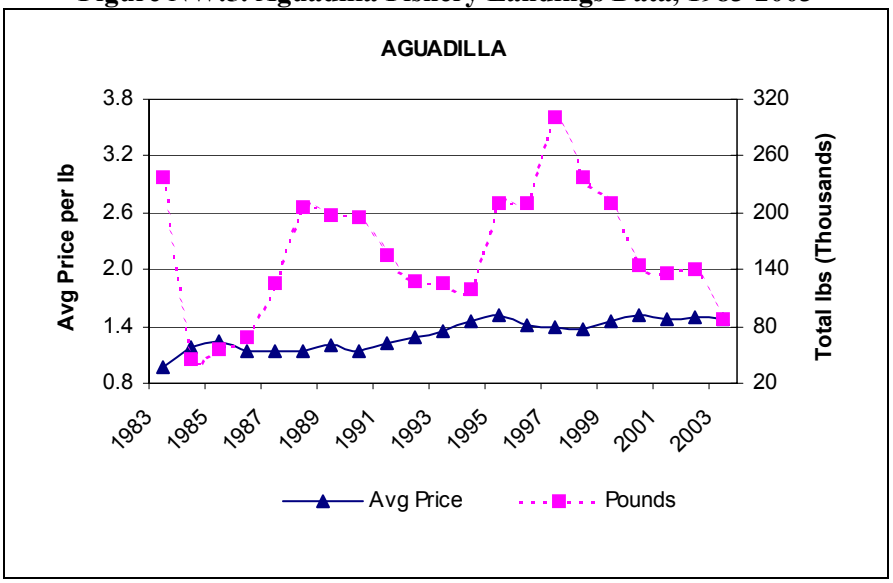
AGUADILLA	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	44,357	47,864	51,355	54,606	59,335	64,685
Civilian Labor Force (CLF) [2]	11,332	9,564	10,647	14,229	18,576	18,890
CLF - Employed	10,676	8,620	9,876	11,062	13,427	14,108
CLF - Unemployed	656	944	771	3,167	5,149	4,782
Percent of unemployed persons	5.79	9.87	7.24	22.26	27.72	25.31
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		1,876	978	212	297	177
Construction		704	811	787	689	1,105
Manufacturing		864	1,482	3,063	3,004	2,770
Retail trade		1,496	1,856	1,395	2,271	1,490
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	N/A	17.7	23.8
Persons who work in area of residence [6]		9,972	10,259	8,286	10,684	11,120
Per capita Income (dollars) [7]			992	1,803	3,722	6,996
Median Household Income (dollars) [8]		1,291	2,360	4,430	7,116	11,476
Individuals below poverty level [9]			32,740	36,033	38,109	35,027
Percent of Individuals below poverty level			63.75	65.99	64.23	54.15

Aguadilla is home to one of the largest and most well organized and politically active Villas Pesqueras, Crash Boat, whose president is a highly skilled boat-builder, providing distinctive vessels to fishers throughout the northwestern part of the island. In the past, Aguadilla fishers have lobbied effectively on behalf of fishers across the island, participating in particular in the outcry against establishing a marine sanctuary in Parguera in the late 1980s (Valdés 1990; Griffith and Valdés 2002).

In Aguadilla, as across much of the island, commercial fishing thus provides income and employment in a beleaguered economic setting. Our survey found that just under half of the Aguadilla fishers we interviewed worked outside of fishing—most of these (45%) in construction. Over half of those interviewed (54.2%), however, still depend on fishing as their primary economic activity, and half believed it would be difficult to find work outside of fishing.

Aguadilla's total landings in 2003, 87,582 pounds generating slightly more than $143,000. In terms of 1999-2003 landings, it ranks fourth in Puerto Rico. As with Aguada's landings data, those in the graph below show little correlation (1983-2003 correlation coefficient = .0258) between fish supplies and price, with the 1997 spike creating only a modest drop in price and the lows of the early 1990s and 2003 met with a similarly languid response.

Figure NW.5. Aguadilla Fishery Landings Data, 1983-2003



As noted earlier, Aguadilla has one of the more powerful and well-organized fishing associations on the island, in part because of the leadership abilities and fishing skills of its president. We profile this association, Crash Boat, below.

Crash Boat

The Crash Boat area includes a long beach where recreational/ tourist infrastructure adjoins the fishing association. There is a large *muelle* (concrete pier) where they used to service oil tankers, but that has since been abandoned to the bathers; the association appears not to use this pier. A small cart/ truck where they sell food, sweets, etc., operates occasionally, on the weekends, and a small bar that operates through the week sits beside the parking lot beside the association. The association itself is surrounded by a chain link fence with at least two gates, taking up an area of around 8,000 to 10,000 square feet.

Figure NW.6. Aguadilla Fishing Association Entrance, Crash Boat, Aguadilla

According to Sea Grant personnel, this is the best-equipped *Villa Pesquera* on the island, led by a fisher who is also an artisanal boat builder. When we interviewed him, he was building an 18' vessel with an upward-sweeping, pointed hull that is perfect for the way they land their vessels here: running them up onto the beach. These designs differ from those farther south, around Parguera, where the front end is less pointed. Beaching a boat, Aguadilla fishers cruise parallel to the shore behind the wave line, then make a quick turn toward shore and run the boat up onto the beach. Several people (usually 3-4) greet the boat, mostly younger men who have been hanging around the association, but old men as well, and they help carry the plastic gas tanks, the gear, and the motor, hoisting their 40 hp Johnson outboards onto their shoulders to carry to the lockers. Landing the day's catch thus becomes a group rather than individual effort—an observation made again and again across the islands of Puerto Rico.

Perhaps reflecting the expertise of the association president, Aguadilla fishers fish from boats with fresh coats and paint, well-maintained, which are 18 feet in length: they are the proto-typical artisanal fishing vessel, wooden with a kind of protective fiberglass paint coating. Each fisher landing fish stores them in black boxes like a large Tupperware tub and carried them on a stick or metal shaft with wire through the mouths. This is a lot of weight to carry, around 200 lbs.

In addition, they store their boats on the beach; the first day we visited, there were 27 and 30 on the beach, but they were coming in during our time there (between 2:00 and 3:00 pm), landing dorado (dolphin), picua (barracuda), and other pelagic species. Their storage facilities are capable of storage for at least 28 fishers. They landed loads of around a dozen or so fish, mostly dorado, caught by hook and line, each of the fish weighing between 5 and 15 pounds. One load weighed 190 lbs.

Figure NW.7. Weighing Dorado in Aguadilla

Along with the lockers and enclosed area, they have elaborate freezer facilities and a nice area to clean fish and to sell fish. The fish market is air conditioned, but the area behind it has a band saw used to cut large fish like yellow fin tuna, counters, a hose, and sinks for cleaning fish. We watched the association president cut a 50 lb. yellowfin tuna into three large pieces for a small Chinese man and clean a dorado with a few deft cuts of the knife, skinning it prior to cutting out the filets.

Figure NW.8. Aguadilla Fishing *Yolas*

Figure NW.9. Building a *Yola* in Aguadilla

Figure NW.10. Selling a Yellowfin Tuna, Aguadilla

Figure NW.11. Freshly Painted Fishers' Storage Lockers at Aguadilla

Figure NW.12. Band Saw with Tuna in Fish Cleaning Room

According to fisher census data, between one half and one-third of fishers in Aguadilla belong to an association, although the high percentage of fishers who list pelagics as a target fish type, behind reef fishes and deep water snappers, suggest that other fishers in the municipality also target fish such as tuna and dorado off the west and north coasts. The following tables, from the fishery census, profile the fishing styles, marketing behaviors, and other dimensions of Aguadilla fishers.

Table NW.8. Association Membership, Fishing Locations, and Types:Aguadilla (n=59)

Variable	Percent
Affiliated to an Association	57.6
Shore	15.3
Continental Shelf	78
Shelf Edge	37.3
Oceanic	57.8
Reef Fishes	72.9
SCUBA Diving	5.1
Skin Diving	10.2
Pelagic	59.3
Bait	62.7
Deep Water Snappers	61

Again, like Aguada, Aguadilla fishers tend not to be divers, but instead specialize more in fishing with various types of lines. The following table reaffirms this, showing relatively low percentages of nets, traps, and diving equipment, with far higher uses of lines of various sorts and associated gear (e.g. gaff).

Table NW.9. Gear Utilized in Aguadilla (n=59)

Variable	Percent
Beach Seine	11.9
Trammel Net	0
Long Line	45.8
Troll Line	49.2
Fish Trap	6.8
Gill Net	10.2
Cast Net	40.7
Hand Line	79.7
Rod and Reel	11.9
Lobster trap	1.7
Snapper Reel	8.5
Winch	3.4
Skin	0
Spear	5.1
Lace	3.4
SCUBA	1.7
Gaff	67.8
Basket	0

Our survey data elicited similar data from Aguadilla, with hook-and-line rigs, including two types of *palangres*, accounting for 62.5% of primary gear. By contrast, traps accounted for only 8.3% and diving, free diving, for 4.2%. No one mentioned SCUBA diving.

Regarding marketing behaviors, the Aguadilla association is the largest in the municipality, accepting fish from members and non-members alike, as indicated by the higher percentage of fishers who sell to the association than those who reported being affiliated with the association.[11]

[11] Association membership has other advantages besides marketing, including the use of facilities and political support in time of opposition to regulations or other developments.

Unlike Aguada, a higher proportion—over twice as many, 22% vs 8.3%—of fishers in Aguadilla do not market their catch, suggesting that subsistence fishing in Aguadilla may be more prevalent than in its neighboring municipality to the south. When we compared those who do not market their catch (whom we call subsistence fishers) to those who do, we found only two differences in terms of where they fished: subsistence fishers tend not to fish either the shelf edge (Pearson's chi-square tests = 6.246; df = 1; p = .015) or for deep water snappers (Pearson's chi-square = 3.566; df = 1; p = .059).[12] Regarding types of gear they use, subsistence fishers were only slightly less likely to use troll lines than fishers who sell their catch.

Table NW.10. Marketing Behaviors in Aguadilla (n=59)

Variable	Percent
Private	0
Fish Buyer	23.7
Association	64.4
Walking	10.2
Restaurant	0
Own Business	0
Gutted	44.1
Ice	8.5
None	22

As further evidence that there are more subsistence as well as part-time fishers in Aguadilla as in Aguada, we find that the hours devoted to fishing activity are, on average, lower, with a few fishers (nearly 12%) reporting fishing zero hours, indicating they were not actively fishing during the time of year the census data were collected. The table below also shows that, contrary to Aguada, where 16.7% of fishers reported devoting over 40 hours per week to fishing, no fishers in Aguadilla so reported.

Table NW.11. Hours Used for Fishing in Aguadilla (n=59)

Variable	Response
< 20 hours	23.7%
20 – 30 hours	39%
31 – 39 hours	13.6%
40 hours	23.7%
> 40 hours	0%
Mean hours	25.73
Standard deviation	13.136
Minimum hours	0
Maximum	40

Census data also show that Aguadilla fishers have mixed views on the state of the region's fisheries, with around one in five believing that the fisheries are no worse today than they were during earlier years and nearly half believing they are worse. This may vary by the age of fishers, with older fishers assessing resources from a different baseline, although when we compared fishers over 40 years of age to fishers under 40, the majority of both groups still saw fishery resources as worse now than before (65% of older vs. 56% of younger). That overfishing was cited as a reason more often than government regulations is interesting in that Aguadilla fishers were among the more vociferous opponents to the proposed marine sanctuary in Parguera in the late 1980s (Griffith and Valdés Pizzini 2002: 211).

[12] Chi-squares were computed for a two-by-two table; generally, a p of <.05 is considered significant.

Table NW12. Opinions of Aguadilla Fishers (n=59)

Variable	Percent
Status of Fishery Resources	
Better	1.7
The same	22
Worse	47.5
Reasons for problems in fisheries	
Pollution	8.5
Habitat Destruction	3.4
Overfishing	13.6
A lot of vessels/boats	10.2
Currents	6.7
Government	5.1
Laws and restrictions	1.7
Seasonal factors	3.4
Selling fish is getting worse	1.7
Environment	1.7

Our survey elicited slightly different responses than those in the census, with overfishing mentioned in conjunction with the deaths of coral reefs but not with declining fisheries resources. Instead, 62.5% mentioned contamination, including noise pollution, and 12.6% blamed government regulations.

Barrio Higuey & El Tamarindo

Two other fishing associations in Aguadilla, Barrio Higuey and El Tamarindo, are both near the waterfront in downtown Aguadilla. Neither is as vibrant as Crash Boat. According the Wilson (1998: 164-66), Higuey had 19 members in 1998 and an additional five fishers fished independently out of the neighborhood; Wilson failed to report that number of fishers at El Tamarindo, although his narrative implies that both associations had seen better days: "According to our key informants, in the past ten years the area has changed very much. In the past there were a lot of *kioskos* and the fishers had access to almost all the coast near the town. However, now the *kioskos* are abandoned and in ruins. All that is left is a part of a boat ramp and around ten to fifteen *yolas* situated in the rocks."

During our fieldwork, we were unable to intercept any fishers at either of these associations, which may indicate their memberships may have declined even further over the past six years. Wilson reported that Aguadilla officials didn't consider fishing a key part of the local economy and that fishers in the downtown area complained that the local government sought to displace them by developing a marina near their facilities. This effort served to redirect the flow of sand, eroding Higuey's beach while building up El Tamarindo's, and failed to achieve its objective of creating a port. Large ships cannot enter its shallow, sand-choked waters.

Like fishers in Crash Boat, the downtown Aguadilla fishers used lines primarily, reporting specifically the multi-line rig called a *palangre:* this consists of several hooks and lines attached to a main line that is anchored on one end to the bottom and buoyed at the other; other variations on *palangres* exist, but they share with long lines the characteristic of multiple hooks from multiple lines hanging in the water column from a single main line. Matta (1989) shows two variations on *palangres* in his sketches of gear types.

Wilson also reported a great deal of mistrust of fishery regulations especially in Higuey, where fishers complained that regulators favored recreational fishers, most of whom fish for big game fish (like marlin) from Club Naúticos on the island's north and west coasts. Tournament fishing, they claim, takes up to 200 marlins per tournament, and many of these end up in the black market. They also sited problems with the ornamental or aquarium fish industry, suggesting young divers are picking reefs clean of small, pretty fish, using solutions that stun the fish.

Finally, Wilson reports that during the 1990s, Aguadilla fishers had problems with longline fishers from US mainland ports fishing for tuna and other highly desired pelagics in their waters. Complaints to the DNR about what they viewed as an incursion into their territory fell on deaf ears. When government officials took no action, fishers reported cutting the mainland fishers' lines at night.

Southern Metropolitan Region:

Ponce & Juana Díaz

Regional History

Historically a region of contraband and piracy, with a rich Taino prehistory, Ponce has become a major port and is rapidly rivaling the San Juan metropolitan area in economic importance. Juana Díaz has benefited from this growth, although it has not received the heavy commercial traffic—by both land and water—that Ponce has. As important as Ponce has been economically as Puerto Rico's second largest city and rival of San Juan, Vidal Armstrong (1986), in his history of the municipality, suggests that the true value of the municipality lies in its cultural past. Contrasting Ponce with San Juan, which he characterizes as the "bureaucratic capitol," he suggests that early on this part of the southern coast was home to an eclectic mix of international folk. During the Colonial period, Ponce achieved a "cosmopolitan" reputation for having attracted immigrants from Venezuela and the Lesser Antilles—Spanish, French, and English-speaking people, who founded schools and cultural centers that highlighted their heritage.

As with much of the south central and southwest coast of Puerto Rico, Ponce's first enduring Europeans settlement was established by people from San German, the early regional capitol, but only after Ponce de Leon met with the cacique Agüeybana and acquired lands to found a town on Ponce Bay. This town, called Bucaná, existed as early as 1597, and its population consisted of primarily subsistence farmers and fishers who lived in a nucleated, bayside settlement primarily for protection; their selection of this location was clearly oriented toward taking advantage of maritime traffic, despite that they continued to be threatened by piracy. Its early founding, along with settlement in Juana Díaz, led Toro Sugrañes to open his history of Juana Díaz with the comment:

"Esta region costera del País es conocida desde los albores de la colonizaciòn." (This region of the country's coast has been known since the dawn of colonization"—1995: 215)

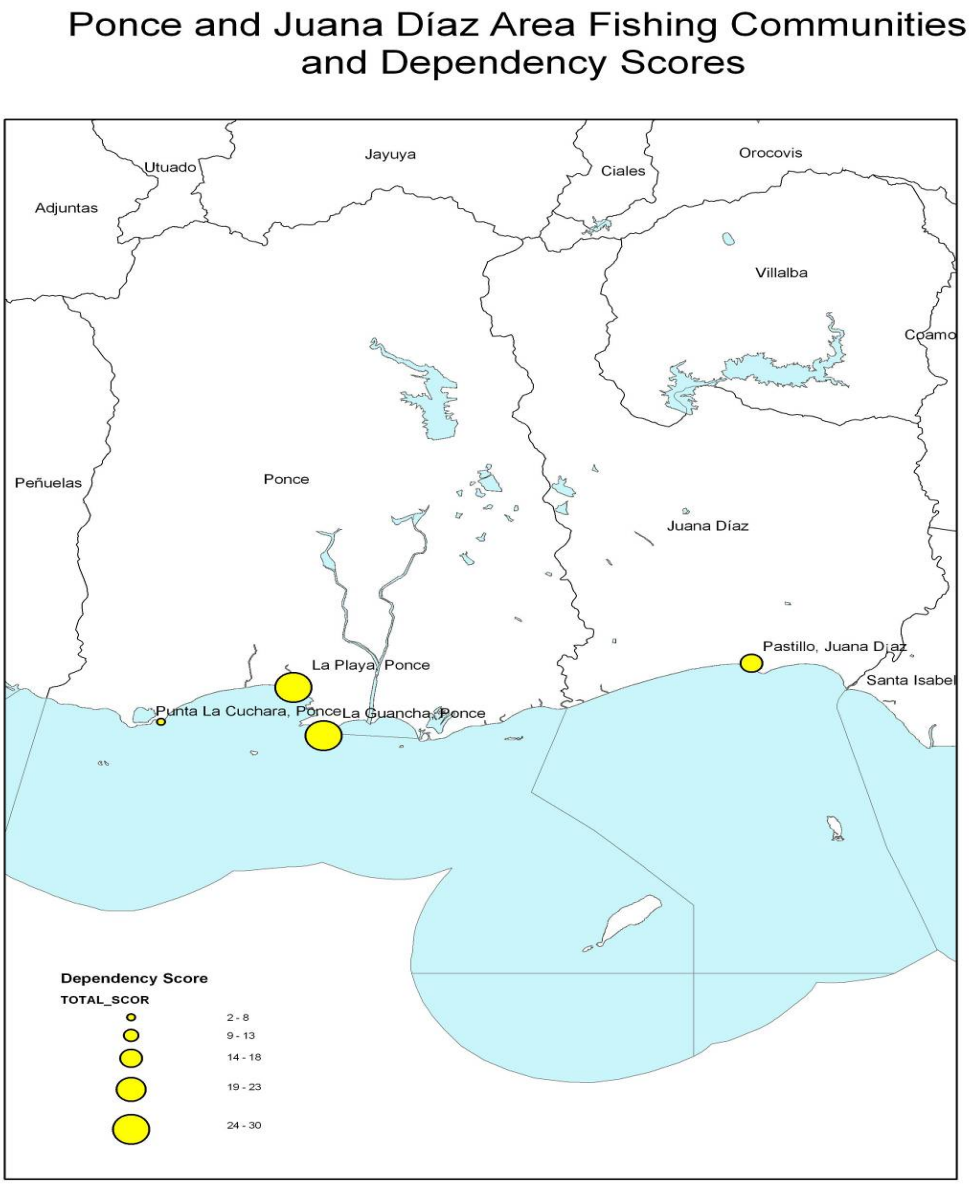
For most of the 17th century, territory in this region of the coast was contested by Caribs and by the French, although late in the 17th century and early in the 18th San German worked to consolidate its hold over Ponce. Early in the 18th century, a San German resident established a sugar mill in Ponce, operating it as an absentee landlord with principally slave labor, and in 1760 the residents of Ponce built a fort and battery to repel continued pirate attacks. Juana Díaz was similarly controlled, bureaucratically, from afar, originally part of and under the jurisdiction of Coamo—the third oldest municipality in Puerto Rico, whose authority ranged over much of the southeast coast of Puerto Rico.

These early internal and external relationships made this region of the coast prone to self-defense, regional autonomy, and resistance. Juana Díaz broke from Coamo in 1798. Like Mayagüez, Ponce established a press early, first *El Crepúsculo* (The Twilight) in 1866 and later *El Annunciador* (The Announcer) in 1867. The entire region was known for both large-scale agriculture and smaller-scale production oriented toward livestock and subsistence farming. Livestock in Juana Díaz were used for milk production as well as meat and for draft animals, and they became a major center for raising horses. As with most of coastal Puerto Rico, sugar grew to dominate the economy of Juana Díaz and rival all other economic sectors in Ponce through the 19th and into the 20th century.

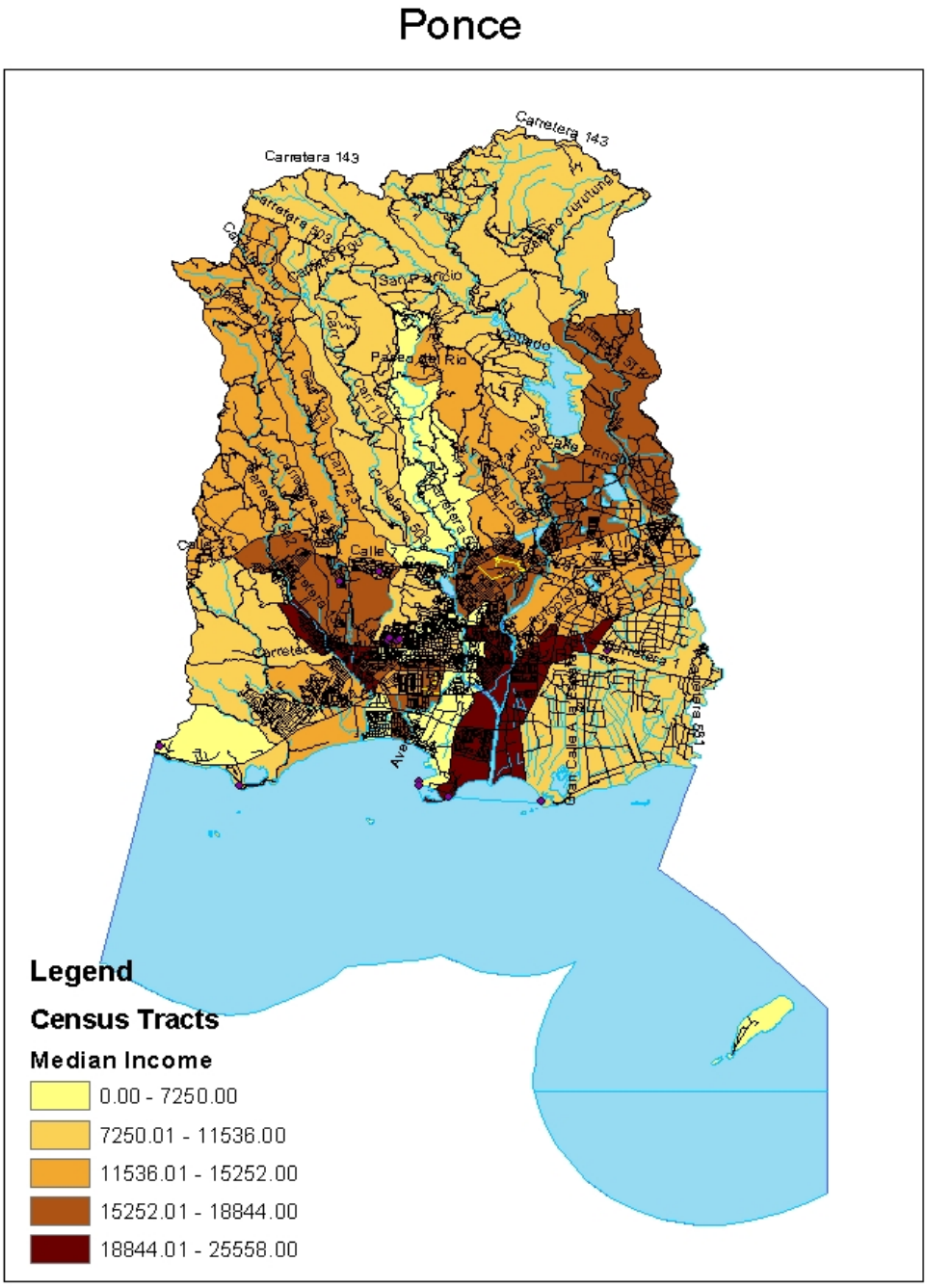
Throughout its history, the region's links to the sea have been substantial. It was among the first regions that U.S. troops invaded during the Spanish American war, and in 1918 also suffered the devastation of

the tsunami. Shipping and maritime trade has been central to Ponce's economy since its earliest days, and Juana Díaz has grown in part because of its proximity to these important port facilities. In keeping with its character as a cultural city, in 1911 it founded the influential newspaper *El Dia* and in the same year the *Teatro La Perla* (Pearl Theater). Through the latter part of the 20th century, the region has attracted more and more internal migrants fleeing the San Juan metropolitan area.

Map SM.1. Southern Metropolitan Region



Map SM.2. Ponce, Showing Caja de Muertos



Ponce

As Puerto Rico's second largest city, Ponce, and the municipality by the same name, can hardly be said to be dependent on fishing to any great degree. As the table below shows, those involved in the extractive enterprises of fishing, farming, agriculture, and forestry have never made up a large portion of the municipality's population, with only around two-tenths of one percent involved in those activities. Nevertheless, Ponce's three fishing centers represent important variations on the ways that fishers across Puerto Rico utilize the region's fishery resources, and the urban economy of Ponce offers fishers a wide range of possibilities to supplement fishing income and take advantage of high levels of weekend traffic to the ocean.

Table SM.1. Ponce Demographic Data

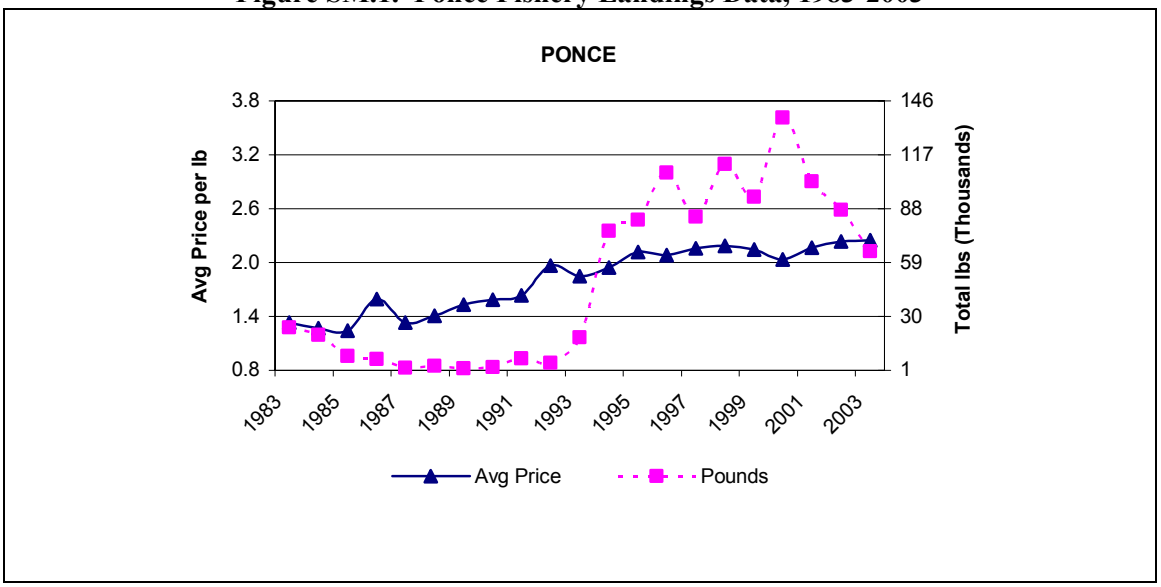
PONCE	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	126,810	145,586	158,981	189,046	187,749	186,475
Civilian Labor Force (CLF) [2]	32,533	36,224	38,826	49,091	59,141	55,714
CLF - Employed	29,496	33,720	36,838	40,619	43,582	41,715
CLF - Unemployed	3037	2504	1,988	8,472	15,559	13,999
Percent of unemployed persons	9.34	6.91	5.12	17.26	26.31	25.13
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		3,676	1,309	730	750	359
Construction		2,760	4,928	2,798	3,182	3,143
Manufacturing		7,916	9,323	8,783	6,546	5,367
Retail trade		4,852	5,878	6,166	7,510	5,811
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	N/A	21.5	24.0
Persons who work in area of residence [6]		29,784	28,332	33,022	39,097	35,130
Per capita Income (dollars) [7]			1,011	2,082	3,735	7,276
Median Household Income (dollars) [8]		1,173	2,585	5,307	7,905	12,998
Individuals below poverty level [9]			100,576	117,162	115,720	95,016
Percent of Individuals below poverty level			63.26	61.98	61.64	50.95

Fishing from Ponce

Ponce ranks 10th in landings, just below its neighbor Juana Díaz, and although only 46 fishers responded to the fisher census from Ponce, the region's two associations alone include over 100 fishers. A third area, Punta Las Cucharas (Spoons Point), has another dozen fishers, although they fish on more of a part-time basis. Ponce also has one of the largest yacht clubs on the main island of Puerto Rico, a large Club Nautico which shares grounds with one of the principal fishing associations, and relatively rich fishing grounds only a few miles off shore, around an island called *Caja de Muertos*, which is shaped like a "box of the dead:" a coffin.

Like other municipalities, Ponce's landings have been sporadic over time, yet show a general upward trend from 1983 to the end of the 20th century; since that time landings have been declining. Price has been stable over time, with if anything a negative relationship to supply (correlation coefficient = .7999).

Figure SM.1. Ponce Fishery Landings Data, 1983-2003



Situated on the south central coast, people fishing from either Ponce or Juana Díaz, whether recreationally or commercially, have access to waters that include the favorite island called Caja de Muertos (Coffin Island) and extend east and west along the continental shelf. This region is unique for its interesting ties to tourism at La Guancha and its lobster-based trap fishery in Juana Díaz, which specializes to a degree uncommon in Puerto Rican fisheries. While parts of these waters can be productive, people living in close proximity to the water of Puerto Rico's south coast, unfortunately, have also witnessed some of the most expansive industrial development, thermal pollution, and, here, metropolitan growth that has altered marine and littoral habitats in ways that fishers have worked hard to circumvent and adapt to. Shipping traffic presents another obstacle to fishing. People interviewed here, when questioned about the health of coral reefs or the marine environment generally, routinely report their demise as due to "anchors from ships," or "contamination from the discharge of factories."

The significant fishing sites in Ponce include La Guancha, a large association in the municipal area that neighbors the Club Nautico de Ponce and the Ponce Yacht Club; La Playa, an association in downtown Ponce, on the water, that also serves as a marina for police and recreational vessels; and Punta Las Cucharas, an area of wooden houses in stilts, near a lagoon, where a dozen families rely on fishing much as the retired fishers in El Faro, Guayanilla, fishing primarily for subsistence, barter, and some market, managing to achieve a certain degree of solitude and isolation only a few miles from Ponce's bustling center. The different fishing areas of Ponce are all within 15-20 minutes by car from each other, but from La Guancha to Punta Las Cucharas is difficult not to feel that one has traveled between two countries instead of between two coastal locations of the same municipality that share fishing as an important economic activity.

La Guancha

On July 25th, 2004, Puerto Rico's Constitution Day, lines of cars and school buses full of visitors clogged the exit off the main interstate (*autopista*) to La Guancha. A large lighted highway department sign read, "La Guancha," in large letters, directing travelers to the waterfront area with a huge orange arrow. The traffic from San Juan, from the north, was backed up for miles; it had come to a complete halt. The 1,200

parking spaces at La Guancha were insufficient to contain this many people; shuttles that ran daily from alternative parking spaces and downtown Ponce would run throughout the day.

This was the scene at La Guancha on Constitution Day, a major Puerto Rican holiday, yet it is not uncommon for well over 5,000 people to visit La Guancha on a weekend. The shuttle service that ferried people from downtown to La Guancha is not restricted to Constitution Day but runs every weekend. Here leisure and commercial interests are so thoroughly intertwined that they form one massive tourist attraction. People come here to eat fish, feed tarpons that school around the docks, and enjoy music. Inside the association facilities, which are large and surrounded by a fence, are several docks, tables, a counter that sells food, a fish cleaning facility, a tower, and boat repair shop. Hundreds of people gather here, buying *helados* (ice cream), seafood, sardines, walking among the facilities, spending their afternoons. Over a weekend, several thousand people visit. In and around the *Villa Pesquera,* old men and women sit in the shade near the restaurant or bring their families to the exclusive part of the association where only the association's members are allowed. In this way fishers reaffirm their membership in a community of fishers—essential for the development of social capital—while engaging the wider community of Ponce and southern Puerto Rico.

La Guancha is a family entertainment place, with many couples with their children eating seafood and buying sardines to feed tarpon. Tarpon school in three or four locations near the docks, waiting for handouts, and the association does a thriving business selling sardines to kids to feed them and the pelicans. The association also operates their own restaurant and hosts fishing tournaments, elaborating their linkages to tourism and recreational fishing after the fashion of the most successful of Puerto Rico's fishing associations.

Figure SM.2. Fishers and Tourists at La Guancha on the Weekend

Figure SM.3. Fishing Vessel (the Santa Clara) in the Harbor at La Guancha

In these and other ways, La Guancha fishing association has taken advantage of the growth of this as a major port, partnering with the municipality of to become a central part of this development. There is a public beach nearby and a large new park with playground equipment; the Club Nautico de Ponce and Yacht Club also share this space. A large snapper vessel ties up here; fishers reported they use it three or four days per week fishing for the association's restaurant. All around the area are warehouses and other port facilities, but the area immediately adjacent to the association has no industrial feel.

Figure SM.4. Tourists Feeding Tarpon at La Guancha

As noted earlier, parts of the facility are private, for association members only, where they can play pool and get away from the crowds. Another part, where they repair the boats, was also off limits to the general public, surrounded by a chain link fence. These repair and associated services aren't restricted to the association grounds. At La Guancha it is clear that economic activity in the sector is eminently maritime or maritime-associated. Boat repair and supplies shops are prominently advertised and several large warehouses filled with shipping containers can be seen. The Ponce Harbor spans across both the La Guancha and La Playa fishing areas; currently the second largest and second most active commercial port in Puerto Rico, it might soon be the first: The huge Mega-Port (El Megapuerto) of the Americas is proposed for Ponce and construction work could begin as soon as 2005, according to government advertisement billboards posted along the road leading to the area.

La Guancha focuses coastal tourism and recreation in Ponce. A large and very well-maintained boardwalk (Paseo Tablado de La Guancha) with a bar/disco/restaurant and several kiosks was built in the area. External and internal tourists visit the boardwalk area on the weekends on numbers that can only be described as several hundred at any given time during the day. Our observations determined that there were >1,200 parking spaces in the area. With an average of only two persons per car, a conservative estimate would place the daily traffic on the weekend at 2,400, though this doesn't account for people

coming and going. On Puerto Rico's dry southern coast, La Guancha benefits from more consistently sunny weather as well. There is also a semi-artificial sandy beach that was evidently stolen from the mangroves that originally filled the area. Dead stumps of mangroves peppering the beach attest to this.

La Guancha is also home of the very high-class Club Náutico de Ponce marina. Several hundred luxury powerboats and sailboats hail from the Club Nautico. 40-50 foot Hatteras, Bertrams, of Chris-Craft powerboats are not rare in the Club Nautico, which also hosts some of the most famous yearly parties and social events attended by Ponce's socialites. In the parking lot, typically, late-model Mercedes Benz, BMW's and Cadillacs predominate. Right between the Club Nautico and the Paseo Tablado there is fisher association.

The Asociación de Pescadores y Dueños de Botes de Motor de La Guancha Inc. is where fishermen of La Guancha hail from and land their catches, and also where they fix their boats and socialize with other fishermen, though this is a network-based community, with fishers living in parcelas around the southern coast, including in Ponce and Juana Díaz. The 20-30 slips right next to the Association are filled with working boats, such as 15-18 foot yolas and Crabber-style SeaHawk 20's, as opposed to the six hundred thousand dollar, 50-foot Bertrams next door in the Club Nautico. There is also a ramp for the fishermen, although much smaller than the one used by the private boats on the other side of the Bay.

One of the fishermen reported that fishers from La Guancha fish mostly using nasas or *malacates* (diesel-powered rigs for pulling up deep water fishing lines; the word often refers to the entire rig, including the engine, pulley, lines, hooks, etc.). Also that the most frequented fishing grounds are Caja de Muertos, Las Coronas, El Derrumbadero and Cabo (the last two are names of fishing grounds on the seaward (south) side of Caja De Muertos. Red snapper (*Lutjanus vivanus*) and king mackerel (*Scomberomorus regalis*) are the most important fish species. He mentioned that fishermen of La Guancha Association come from "all over the place," which is another ways of saying this is a network-based community. Again, those we interviewed, combined with census data, do suggest that they come from Ponce as well as neighboring municipalities. Based on the number of working vessels, between 20 and 40 fishers fish out of La Guancha, although the number could be higher, given the presence of the large trap vessel the Santa Clara.

While the recreational traffic generates a fairly large local market for fish, freezer trucks in the parking lot during the weekdays suggest there must be middlemen-type marketing activity going on. On the weekends the La Guancha grounds serve as a landing site, a boat maintenance and repair site, an area of cleaning and preparing fish, a tourism point of interest, a restaurant, a social gathering and information exchange center for the fishermen (the death of a member's son and the place of vigil were announced in a blackboard near the fish cleaning area), and even a wildlife viewing area.

This lengthy description of economic activity is due to the fact that it represents one of the ways that fishermen associations in Puerto Rico take advantage of nearby tourism and recreational infrastructure, even becoming a tourism point of interest themselves. By doing this they attract large groups of people. Essentially, association members have integrated themselves into the recreational and tourism sector (who are different stakeholders and in some cases oppose commercial fishers).

During the 1990's the city of Ponce, received a very large, economic revitalization boost from a project called *Ponce en Marcha* (Ponce Marches On). Tourism and recreation infrastructure absorbed a massive infusion of public funds, and La Guancha was one place that received funds for recreational development. This was probably to the detriment of other coastal areas, such the commercial harbor of the La Playa area, discussed below. While we cannot know for certain that fishers are making a profit here, attracting such large amounts of people to the grounds and restaurant can't be all bad, since cash is flowing. As a Puerto Rican proverb says, *El que se pega al chorro se moja* ("If you get near the water fountain, you're

bound to get wet"). In any case, La Guancha is an exemplary case of how fishing and coastal development, particularly tourist development, have become vertically integrated, with fishers supplying seafood markets, processing seafood, and entering retail markets while also embracing other dimensions of tourism, up to and including becoming a tourist attraction themselves. They have accomplished this, moreover, as a network-based community, in part because they have managed to hang on to an elaborate space in the midst of other kinds of port development—a space that evokes the culture of fishing, that continues to constitute a working waterfront, reaffirming fishing's moral dimension, and that maintains exclusive space for fishers and their families, helping them continue they are part of a fishing community—a part of, yet apart from, other residents of and visitors to Ponce.

Club Nautico de Ponce

Similar to commercial fishers from La Guancha, a recreational fisherman we interviewed in Ponce reported that he fishes in the waters around La Caja de Muerta, but added that this is an unknown destination among most recreational fishers, very productive. He also reported disliking, intensely, the DRNA, saying that they have a heavy-handed approach to managing natural resources, that they don't care about input from the public, and that they seem composed of under-educated men and women who have few if any public relations skills.

Ponce Marine Supplier

La Guancha is also home to one of the most well-stocked marine suppliers on the island, whom we call Marcus. Marcus has been in this business for 30 years and in this La Guancha location for 15. He was well informed about the recreational boating/ fishing crowd of Ponce and has business ties with Club Nauticos all over the island as well as with people from several foreign countries: he mentioned China, Germany, Brazil, etc. He said that he knows of at least 6 fishing tournaments sponsored per year, one by each Club Nautico, and he supplies various products to each of these.

His shop resembles an auto parts store, only for boats, with not only parts for boats but also hooks, gaffs, and other sportfishing equipment. Three people were there the day we interviewed him, the other two young (perhaps his sons), and his wife's name is with his on his card. He told us about a few charters operating out of the south coast and mentioned that information about each of them would be available at the Ponce Hilton. Evidently most of the charters' traffic comes from tourists, gringos, and foreigners who are staying at the hotels.

In addition to fishing supplies, he sells a kind of specialty bait from a freezer: it's ballyhoo, packaged in small packs of around a dozen fish exactly the way that most sport fishers like it. He says there's a man in Cabo Rojo who fishes the canals inside the mangroves with a cast net and is known for packaging it this way. He had a freezer full of these packages. His business can't be said to be local, with all the international traffic and the ties among Club Nauticos and him around the island.

From the Ponce Hilton, which is near La Guancha, we found information on several charters who operate on the southern and western coasts. These include:

Charters:

Capt. Mickey Amador
Parguera Fishing Charters
(787) 899-4698
(787) 382-4698
hometown.alo.com/mareja
mareja@aol.com
PO Box 36
La Parguera
Lajas, PR 00667

Island Ventures
(787) 842-8546
Rafael Vega
(787) 616-8468

Tour Marine
(787) 851-9259
Joyuda, Cabo Rojo, Mona & Desecheo islands

Of a list of 12 charters at the Ponce Hilton, 5 were on the north coast (Dorado, San Juan, Carolina), four were on the east coast (Farjardo and Humacao/ Palmas del Mar), and only 2 were on the south/ west coasts, one in Parguera and the other in Joyda or Cabo Rojo. Hence, the south and west seem to be more or less afterthoughts with the charter boat community.

La Playa, Ponce

La Playa is a barrio within the coastal section of the larger metropolitan area of Ponce, linked to the larger city yet without the thick traffic and noise, that distinguishes itself through its long history of attachment to the sea. This is most evident in a park/plaza along its waterfront, a few blocks from the modern facilities of the community's *Villa Pesquera*. One section of the park is dedicated, quite elaborately, to the community's fishing past. With ornamental colored tiles, a set of five steps leading to the sea tell of the community's origins during "la epoca de la marina." Off to the side of the steps is a concrete bench in the shape of the hull of a ship, and the rolled-fin, hooked sculpture at the top of the steps depicts the names and images of fishers who have lived in La Playa, as do the walls at either end of the steps. Most importantly, behind the sculpture is a monolith with the image of the Virgen del Carmen.

Figure SM.5. Steps Outlining La Playa History, Ponce

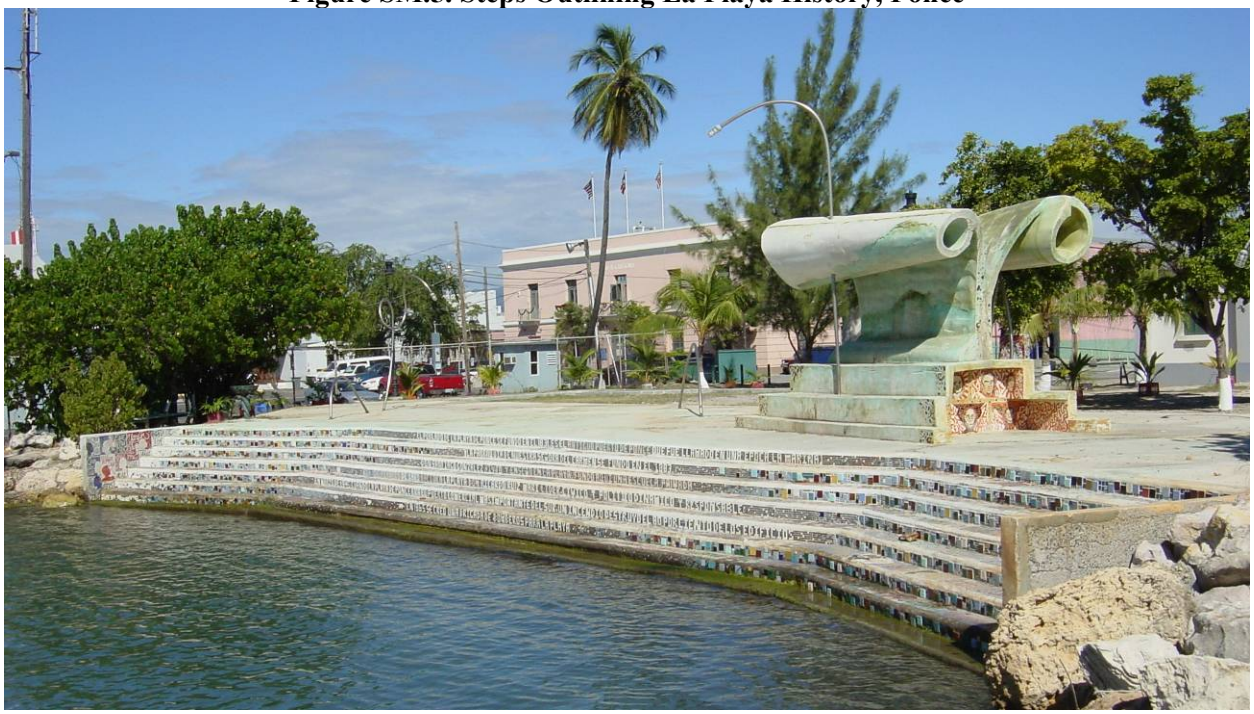


Figure SM.6. Steps Outlining La Playa History, Ponce

Figure SM.7. Virgen Del Carmen Monolith, La Playa, Ponce

La Playa Villa Pesquera

In a western coastal section of the city of Ponce, within view of the port facilities and warehouses around La Guancha, *La Playa Villa Pesquera* serves fifty-three members. It is the largest fishing association in Ponce and they have some of the nicest association facilities in western Puerto Rico, newer looking than Aguadilla's, with sheltered docking facilities with numerous slips and a small stretch of beach where a few old vessels rest. There are many lockers for gear, a small seafood restaurant, and a small fish market.

Figure SM.8. Marina and Association Facilities at La Playa, Ponce

They sell many varieties of seafood for the following (March, 2004) prices:

Arrayo	$2.90/ por libra	Colirubia	$2.75
Sierra	2.50	Chillo	4.50
Chapin	3.00	Pargo	2.75
Dorado	3.00	Peje Puerco	2.50
Atun	2.50	Boqucolorado	2.00
Sama	3.00	Mero	3.00
Capitán	4.00	Burro	2.50
Tiburón	2.50	Loros	2.50
Langosta	7.00	Pulpo	3.50

Extensive construction and remodeling went on inside the association grounds during the spring of 2004. The restaurant, which markets catch from members, was finished and operating, and according to the secretary, the concept of the restaurant is a small place where (mostly locals) people know they can go and get high quality, fresh fish straight form the source (this differs from the La Guancha association's restaurant, which caters to large crowds of mixed locals and tourists. Also a host of new lockers are being constructed and the fish cleaning/processing and fish vending areas are being remodeled as well. These remodeling jobs are undertaken communally, pooling resources to hire specialists (e.g. electricians) as needed.

According to another administrator of La Playa, association members use Palangre (longlines, with 150 hooks or less); single lines or *silgas,* for trolling for pelagics, including (most importantly) mackerels; *luz* (light) for night fishing, suspended either at the surface or midwater, from an anchor or drifting boat; diving equipment, both for free diving and with SCUBA tanks, for octopus, lobster, and reef fish; *nasas* (traps); *chinchorros* (beach seines); *trasmallo* (drift or trammel nets); *La cala/ malacates* (deep water lines, some by hand, but most with *malacates* (engine-powered winches), which are used for red snapper by season and at night, during the new moon; other lines called *lineas de puntas.*

Of these, the predominant gear are longlines and the different forms or line fishing (including trolling for mackerel and deep water lines). When fishing for *sierra* (king mackerel), they follow one of two strategies: 1)The "silguero" (troller) trolls around shelves and bays around dawn or 2) The "*luz*" fisher fishes at night, when the light attracts the mackerel.

All the association members are bound to market their catch through the association. "There is a "compromiso" (an agreement bound by word of honor) between the fishermen and the association, that they will always market their catch (of certain high value species) through the association; in return, the association always buys all their catch from them (an exception to this is during Lent when at times the association administration will order the fishermen not to bring any more mackerels if the freezers are too full with them, until they alleviate some of the surplus. When that happens, the fishers know in advance that if they go for mackerel, they will have to sell it on their own for a while). Everybody keeps to their agreement, with very few exceptions. The association assumes the greatest risk (which in fact means the risk is distributed more or less equally between the members of the association), for example when a year ago the ice-making machine broke and pounds and pounds of mackerel were ruined.

The association has about 50 boat slips, 60 lockers (some of them furnished with small freezers for species that are not usually marketed through the association, or the catch they wish to keep for self consumption). The most important species the association sells are mackerels and yellowtail snappers. The association's restaurant has been operating for two months, managed by a committee composed of some fishermen and fishermen' wives and family members. Some fishermen family members are employed by the restaurant and fish vending area as well, so the association serves as a source of employment for members of fishers' households).

Association has its own ice making plant "*la planta de hielo*". According to one of the administrators, "the ice plant is an essential component of the cooperative agreement between the fishermen members and the association": Fishermen need (and are required to) take at least two large bags of ice on each trip (more for long trips), so that the catch makes it back to land on good condition and the association's fish vending unit is able to keep to its quality standards and thus keep the clientele happy.

The association is highly active in the politics of fishing. According to one of the association's administrators, the plight of fishermen in the decade began when the management and development of fisheries was put in the hands of the State Department of Agriculture. "They went ahead and mixed us together with farmers!" the administrator said. "Farmers, there are more of them, their product has a greater economic values for the government, so we (fishermen) are always losers if we have a disagreement. If there is a hurricane, for example, the plan for insurance and reimbursements will follow a plan designed for farmers, not for fishermen." For example, a plantain grower, in the case of a hurricane, is reimbursed by the Puerto Rican Department of Agriculture for the entire value (or close to it) of the equipment and the crops he lost, while a fisherman is compensated only for the equipment he lost, not for the catch he could not catch while having no equipment. The informant also mentioned that if fishers complain about the effects of agricultural practices on mangroves and reefs downstream, they will also be at a disadvantage, and that, in general, they are stuck in a system designed for dealing with (mid to large scale) farmers, not with small-scale fishermen.

A phrase uttered by this informant put the current situation between fishermen and the government in Puerto Rico very tersely: "In this Association, we are 50 fishermen, and that makes 50 fishermen who are against the government." Another association administrator placed the number of members at 56, and said that they were all predominantly full-time fishers.

Association members commented that the multi-species, multi-licenses regulations will affect their members in particular. La Playa de Ponce is most heavily dependent on the two kinds of fisheries noted above: 1) Mackerels (s. regalis and s. maculates) and 2) Deep sea snapper fisheries (red snapper, silk snapper, blackfin snapper, and others) (Spanish names: *chillo, chillo ojoamarillo, chillo alanegra (a.k.a. negrita), and cartucho. Arrayao (lutjanus synagris)* and *sama (lutjanus analis)* fisheries are also important, but a little less so, according to this informant (contrast this with the nearby Punta Las Cucharas, where informants report that Arrayaos and octopus are the staple species pursued). According to the informant, the new regulations restrict size limits for deep water snappers, plus the requirement for separate licenses for various deep water species put fishermen in a very difficult position, because "you cannot tell the fish: 'small ones are not allowed to bite' or 'only *chillos* (meaning only x or y species) are allowed to bite today", and whatever you pull up from 200 brazas (very close to a fathom) is going to be bloated (much like a divers lungs when she ascends to fast to the surface) and dead long before reaching the surface." This argument is that the fisherman of deep water snappers has two options: either buying all the licenses for all the species that are caught together (perceived as too expensive), or risk breaking the law and getting tremendous fines.

As vice-president of the association, the informant is also very up to date on fines and administrative procedures that have been initiated against association members. He contends that not only tickets are very often levied on la Playa fishermen, but that he in fact even knows the places in which DRNA law enforcement people 'hide behind an islet' to ambush association members going out to or coming back form the sea. "Many people here have tickets and fines pending at this moment!" He says most tickets are not even related to fishing per se, but to mandatory safety equipment (for example, forgetting to bring a flare or a class IV lifejacket, etc.). The relationship between DRNA law enforcement and fishermen is not what it should be, one of "helpfulness and cooperation, instead of one of regulation", and that one of the culprits of these is that the 'Cuerpo de Vigilantes" of the DRNA are dispatched with orders of ticketing people for minor safety equipment infractions, while environmental destruction by other people (large companies, marinas) goes on in plain sight, with no visible punishment or control: "While they are out there ambushing and fining the small fisherman that goes out to catch a few pounds," he said, "the Ponce Hilton destroyed acres and acres of mangroves and built an artificial beach for its guests. And all the mangrove area that was cut down and re-filled for this artificial beach used to be premium Jueyes (land crab) habitat."

He also claimed that the small road leading to the Club Nautico de Ponce was "robbed from the sea," meaning that where the road passes now used to be a shallow underwater area; in fact, the informant recalls that that area where the road was built used to be a beautiful, very shallow reef, with many juvenile fish and a prime grounds for collecting/browsing for *burgao* (West Indian Top Shell, *Cittarium pica*) and octopus. The informant recalls when this reef was drained and filled with sediment, then cement, and finally asphalt for the cars of Club Nautico Members to pass through: "Nothing happens when all that (destruction) happens, but when it comes to the fishermen, the DRNA has been since the regulations were put in place , '*con el látigo en la mano*' ('with the whip in hand')."

Puntas Las Cucharas (Spoons Point)

The final place we discuss in Ponce is quite different from either La Guancha or La Playa. First, it is not a fishing association at all but a small cluster of homes where some 20 to 30 fishers either depend on fishing or supplement other incomes with fruits of the sea. To get to Punta Las Cucharas, which sits on a peninsula near the El Tuque recreational complex (a water park and race track), you have to wind down a long, rutted, sand and gravel road that ends up at a point of dirty sand, downwind from much of the litter of Ponce. You pass a lagoon and course through mangroves and other landed aquatic plants and end up at a string of around 30 houses built from wood on stilts. Across the road from these houses are mangroves, and interspersed among the mangroves and the houses are a number of small *yolas* that can be launched either from the beach facing Ponce or from the shore facing the sea to the south.

The community is separated from the rest of Ponce by the Las Cucharas Lagoon, on the seaward side of the tidal flats near the mouth of the estuary. There is a small communal dock in a small embayment near the eastern part of the settlement. Most of the houses have fishing equipment, boats, and trailers around them. The presence of the dock suggests some cooperation, though there is no association here. The houses appear to be the homes of the poor, perhaps even lacking basic services. One feature they have in common is that the yards contain several scavenged or used pieces of equipment, construction materials, etc. Much as in the U.S. South, where you see homesteads with all kinds of metal, wood, and other material that may, someday, come in handy, families in Puntas Las Cucharas also seem to collect junk for possible future use. Families recreate in the water off the point, swimming or simply sitting in the water, and a number of scrawny dogs roam freely around the area.

Figure SM. 9. *Yolas* and Communal Pier at Punta Las Cucharas

Figure SM.10. Fisher's House and Yard in Punta Las Cucharas

One of the fishers we spoke with, Hector, was in his late 60s or early 70s. He said he had lived there for a long time and that his only occupation was fishing. Also, he said that there were 12 fishermen in the community, which seemed to agree with the 12 boats moored on or near the water. However, later, we spoke with two other fishers who said that there were actually 20+ fishers fishing from there. Some come from outside the community and launch their boats from there. We were able to see the catch of those two fishers, which included 5-6 octopi, several *arrayaos* (Lutjanus synagris), several *colirrubias*, yellowtail snappers (Ocyurus chrysurus), and an array of small grunts and snappers. They told us that that particular catch was for consumption in a birthday party later on that afternoon. We asked about marketing of fish, and they told us it was done mostly informally, based on word-of-mouth about who was going out and catching fish on particular days, instead of in a highly centralized fashion like it seems to be the case in La Guancha and other larger landing centers. However one of the fishermen pointed out that this way of marketing was highly effective, because they usually had few problems selling their catch.

Hector also reported that fishers from Las Cucharas tend to practice inshore or nearshore fishing, and that practically all of the activity happened in the extensive shallow grounds between Ponce and the landward side of Caja de Muertos island, and practically none of it beyond that towards open sea. The extensive seagrass and sand flats with patch reefs that have a reputation for being highly productive. The shelf and reef drop-offs are pretty far away for these communities (10-12 miles). He mentioned the usual array of handlines, chinchorros, trasmallos, spearfishing and collecting conch as the types of fishing activity in the area.

Results of the Fishery Census in Ponce

Again, fewer fishers participated in the census than we learned fish out of Ponce in our ethnographic work, only 34 compared to over 100 in our study. They are, in addition, serious about their fishing, with high average weekly hours and high ratios of full-time to part-time fishers.

Table SM.2. Selected Fisher Characteristics, Ponce (n=34)

Variable	Response
Association Member	91.3%
Hours used for Fishing	
< 20 hours	4.3%
20 – 30 hours	28.3%
31 – 39 hours	4.4%
40 hours	52.2%
> 40 hours	10.9%
Mean hours	35.93
Standard Deviation	9.794
Minimum hours	12
Maximum hours	60

Source: Puerto Rican Census of Fishers, 2002

Table SM.3. Fishing Territories and Styles, Ponce (n=34)

Variable	Percent
Shore	4.3
Continental Shelf	95.7
Shelf Edge	23.9
Oceanic	58.7
Reef Fishes	93.5
SCUBA Diving	17.4
Skin Diving	26.1
Pelagic	19.6
Bait	37.0
Deep Water Snappers	56.5

Table SM.4. Gear Utilized by Ponce Fishers (n=34)

Variable	Percent
Beach Seine	8.6
Trammel Net	0.0
Long Line	56.5
Troll Line	52.2
Fish Trap	17.4
Gill Net	37.0
Cast Net	80.4
Hand Line	87.0
Rod and Reel	71.7
Lobster trap	6.5
Snapper Reel	15.6
Winch	2.2
Skin	0.0
Spear	17.4
Lace	6.5
SCUBA	8.7
Gaff	97.8
Basket	0.0

Table SM.5. Marketing Behaviors in Ponce (n=34)

Variable	Percent
Private	2.2
Fish Buyer	2.2
Association	91.3
Walking	8.7
Restaurant	0.0
Own Business	0.0
Gutted	54.3
Ice	71.7
None	17.4

Tables SM.5 and SM.6 also indicate fishers who are highly dedicated to fishing, with under 20% reporting that they do not market their fish and fully 91.3% saying that they sell to the association (the discrepancy between these figures may be from reporting past instead of current behavior, or could be a census coding error). Ponce fishers also report using a wide range of gear and fishing in a variety of waters.

Finally, no Ponce fishers captured in the census reported that fishery resources had improved, with the vast majority, nearly 90%, believing that they were worse. Pollution was cited as the most likely culprit for the declines, as perhaps we should expect from a heavily industrialized coast with a busy port and a high urban population that seems to be sprawling up and down the southern coast. We were a little surprised that habitat destruction was not cited with more frequency, given complaints of fishers about the destruction of mangroves from the Hilton and other coastal development.

Table SM.6. Ponce Fishers' Opinions of Fisher Resources (n=34)

Variable	Percent
Status of the Fishery Resources: same	10.9
Status of the Fishery Resources: worse	89.1
Pollution	78.3
Habitat Destruction	6.5
Overfishing	10.9
Beach Seine	2.2
Boats breaking the reefs	6.5
Currents	2.2
Dynamite	4.3
SCUBA Divers	2.2

Juana Díaz

Like other municipalities within driving distance of densely populated metropolitan areas, construction in Juana Díaz remained relatively stable over the most recent decade for which we have data. Similarly, employment in retail trade changed little from 1990 to 2000. This employment picture creates a setting in which the typical movement between fishing and other work may be relatively more easily accomplished than in other areas.

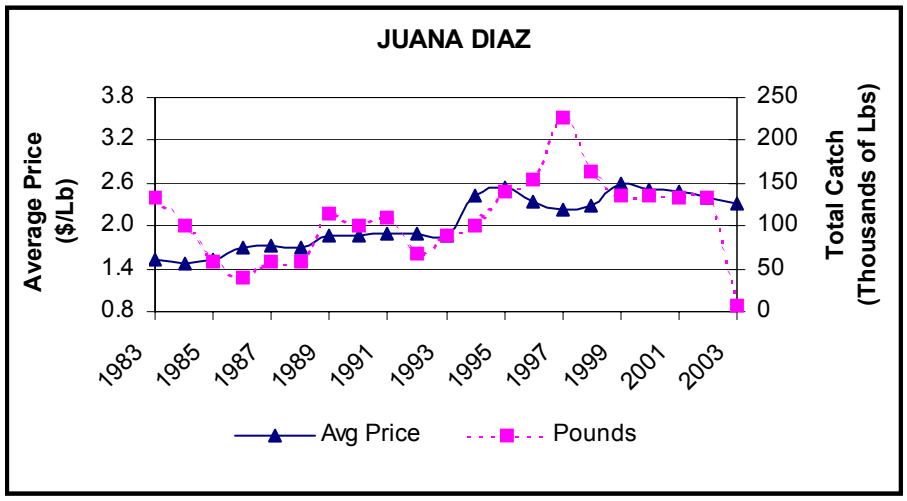
Table SM.7. Juana Diaz Census Data

JUANA DIAZ	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	27,697	30,043	36,270	43,505	45,198	50,531
Civilian Labor Force (CLF) [2]	6,918	6,720	7,201	10,141	12,752	14,135
CLF - Employed	6,503	6,304	6,877	8,247	8,930	10,255
CLF - Unemployed	415	416	324	1,894	3,822	3,880
Percent of unemployed persons	6.00	6.19	4.50	18.68	29.97	27.45
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		2,536	1,011	951	472	586
Construction		612	1,225	795	991	972
Manufacturing		968	1,628	1,639	1,560	1,540
Retail trade		612	762	950	1,157	1,186
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	25.2	23.9	28.3
Persons who work in area of residence [6]		4,232	2,794	3,507	3,397	3,905
Per capita Income (dollars) [7]			648	1,461	2,582	5,632
Median Household Income (dollars) [8]		841	2,129	4,535	6,893	12,892
Individuals below poverty level [9]			27,705	32,343	32,900	28,500
Percent of Individuals below poverty level			76.39	74.34	72.79	56.40

Fishing from Juana Díaz

Just east of Ponce, Juana Díaz is less metropolitan in character yet, according to ethnographic reports, fishers here are tied to Ponce fishers through family ties and some Juana Díaz fishers belong to the La Guancha association. In addition, certainly many Juana Díaz residents work in the Ponce metropolitan area, whose unemployment rate is slightly lower. Landings from this area are slightly higher than those from Ponce, and the two municipalities rank 9th and 10th in the landings data. Several other attributes of the Juana Díaz fishery suggest a robust fishing economy. This is true even in light of the apparent declines in landings from 2002 to 2003, when landings dropped to record low levels. During this time, prices fluctuated within a far narrower range, with the average ex-vessel price around $2.25 per pound. This is somewhat strange, given that the most commonly captured species in Juana Díaz is lobster, accounting for over 60% of the catch. Ethnographic work confirmed its continued importance beyond 2003.

Figure SM.11. Juana Díaz Landings Data, 1983-2003



Villa Pesquera de Pastillo

Perhaps the most notable attribute of this municipality's fishery is its specialization. While the most widely caught species in most municipalities rarely accounts for more than 10% to 15% of the landings, in Juana Díaz lobster landings accounted for 32.2% of the landings from 1999 to 2003. Our ethnographic work in Pastillo, the fishing center, supported this finding as well; members not only target lobster extensively, they build their own lobster and fish pots.

The association is fairly large, with 39 members, 21 of whom are full-time and 18 of whom are part-time. This too differs from other communities where part-time fishers usually outnumber full-time fishers. According to the fisher census, however, association members account for only about half the fishers in Juana Díaz, and 60 percent of the fishers in the census fished for less than 40 hours per week.

Figure SM.12. "Pescador Juanadino" Statue, Patillas, Juana Diaz

Visits to Pastillo nevertheless revealed a community with a heavy dedication to commercial fishing and to supplying the community with fresh fish. In line with their targeting lobster, they are primarily an in-shore fishery, working the continental shelf and nearshore reefs as well as the waters off the coast of Ponce. Their close proximity to these productive lobster grounds may account for their high degree of specializing in lobster, combined, of course, with the species' high ex-vessel and retail value. These grounds include the famous island of Caja de Muertos.

Table SM.8. Fishing Locations and Styles, Juana Diaz (n= 15)

Variable	Percent
Shore	0
Continental Shelf	100
Shelf Edge	0
Oceanic	6.7
Reef Fishes	93.3
SCUBA Diving	13.3
Skin Diving	13.3
Pelagic	13.3
Bait	0
Deep Water Snappers	0

Source: Puerto Rican Census of Fishers, 2002
Totals do not add up to 100% because fishers typically fish multiple locations.

Table SM.9. Selected Juana Díaz Fisher Characteristics

Variable	Response
Association Member	46.7
Hours used for Fishing	
< 20 hours	20
20 – 30 hours	20
31 – 39 hours	20
40 hours	33.3
> 40 hours	6.7
Mean hours	31.8
Standard Deviation	10.692
Minimum hours	10
Maximum hours	48

Source: Puerto Rican Census of Fishers, 2002.

The specialization on lobster is reflected in gear use, with the highest reported gear types being traps—in this case both lobster and fish pots. As noted earlier, they make the traps themselves, of both wire and wood. While the fish pots are almost exclusively made of wire, their lobster pots are either of wire or wood. The latter are an interesting design, pyramid in shape (as opposed to rectangular), which they claim work better than other designs. The wood is recycled from palates that local manufacturing plants give them. They deploy gear from 25 to 30 vessels that tend to be in the 18' to 20' range, made of wood covered with fiberglass; some possessing advanced equipment, such as depth finders and GPS positioning equipment, and many of the younger fishers go to sea with cell phones in case of emergency.

Table SM.10. Gear Used by Juana Díaz Fishers

Variable	Percent
Beach Seine	6.7
Trammel Net	6.7
Long Line	6.7
Troll Line	6.7
Fish Trap	66.7
Gill Net	13.3
Cast Net	13.3
Hand Line	40
Rod and Reel	6.7
Lobster trap	60
Snapper Reel	0
Winch	0
Skin	0
Spear	20
Lace	0
SCUBA	6.7
Gaff	60
Basket	0

That the association does not control the market is something that both our ethnographic work and the census revealed. According to local informants, each fisher in the association has his own freezer and they sell to restaurants primarily (at least half their catch) and afterwards to the local community (about 25%) and to communities elsewhere in the municipality (about 25%). The restaurants that buy their fish are located in Ponce, Salinas, Santa Isabel, Coamo, and Aibonito; the last two are interior municipalities, but the others are coastal municipalities, with their own fisheries. Census data indicate that market

intermediaries—private buyers—are most common, representing 86.7% of fishers; this contradicts the 80% who said they had no marketing strategy.[13]

Our ethnographic work falls on the side of those with marketing strategies. Fishers we interviewed reported that Juana Díaz fishers sell most of their catch; the targeting of lobster would further confirm that they are fishing with an eye toward the market. Fishers reported that fish sales during Lent were particularly brisk; community members, who consume fresh fish routinely, are even more grateful for this supply during the spring holiday.

Marketing is particularly important to divers, who make up between one-third and one-half of the association fishers. They fill their tanks in Ponce, at El Tuque, at $3.00 per tank, using between 5 and 9 tanks per trip. Divers were particularly hard hit by the seasonal closure for conch, which they target behind lobster. They don't disagree with the closure exactly, but some local divers did admit to fishing for conch after the season closed. Some believe that closing conch season indirectly affects the octopus catch. This is because the conch shells provide shelter for small octopus, so fishers leave them in areas where octopus are likely to gather and then return to check the shells. Like fishers elsewhere, they have conflicting theories and practices regarding the disposal of conch shells, with some believing that empty shells repel conch yet others using the shells, as just noted, to lure octopus. However, when they deposit shells to lure octopus, they put them in a different area than where they catch conch. They complained that fishers from outside of the community often leave the conch shells where they find the conch, which Juana Díaz fishers believe spoils the bottom.

Table SM.11. Marketing Behaviors of Juana Díaz Fishers

Marketing Behaviors	Percent Reporting
Fish dealer/ buyer	86.7
Private	6.7
Association	0
Street vending	6.7
Restaurant	6.7
None	80
Sell fish gutted	6.7
Keep fish on ice	13.3

Source: Puerto Rican Census of Fishers, 2002.

In addition to the costs divers incur filling tanks, other costs that Juana Díaz fishers incur include approximately $50.00 per trip for gas, $20.00 per person for breakfast and lunch, and another $4.00 for ice. The association doesn't produce its own ice, but members purchase it locally, as with most other equipment. Materials for the lines cost between $50.00 and $60.00, and other equipment (trap wire, nails, etc.) costs are also rising. They claim that the increasing cost of fuel is responsible for recent declines in landings, causing fishers to make fewer trips or stay closer to shore.

Local fishers also site contamination as a cause, in line with census data. Specifically, they complained that the Salinas water treatment plant discharged their waste water 5 to 6 miles off shore, and that they can't fish in this area due to the odor. Census data indicate that fishers view pollution and habitat destruction as the principal causes of declining resources, but during our ethnographic work fishers reported that the mangroves were in fairly good shape. However, one claimed that the destruction of the mangroves was underway, from "construction and the selling land for hotels."

[13] Of course, this may indicate problems with the census data or the interpretation of the question by fishers.

Table SM.12. Opinions of Juana Díaz Fishers

Opinion	Percent reporting
Status of Fishery Resources	
Better	0
The same	60
Worse	40
Reasons for problems in fisheries	
Pollution	40
Habitat Destruction	20
Overfishing	0
Laws, regulations, and licensing	0
Crowding	0
Seasonal factors	0

More than habitat destruction and pollution, among their principal problems has been barge traffic through the area. Propellers from barges often entangle the lines of their traps, dragging them. They also object to the new licensing regime, although they praised the DRNA for its protection of turtles around Caja del Muertos. They were dismayed, however, with most of the regulations, believing that they did not benefit them. They specifically cited the size limitations, although claiming not that the smaller were dying from rising from great depths, but that they often die on the line and, again, throwing them back is wasteful.

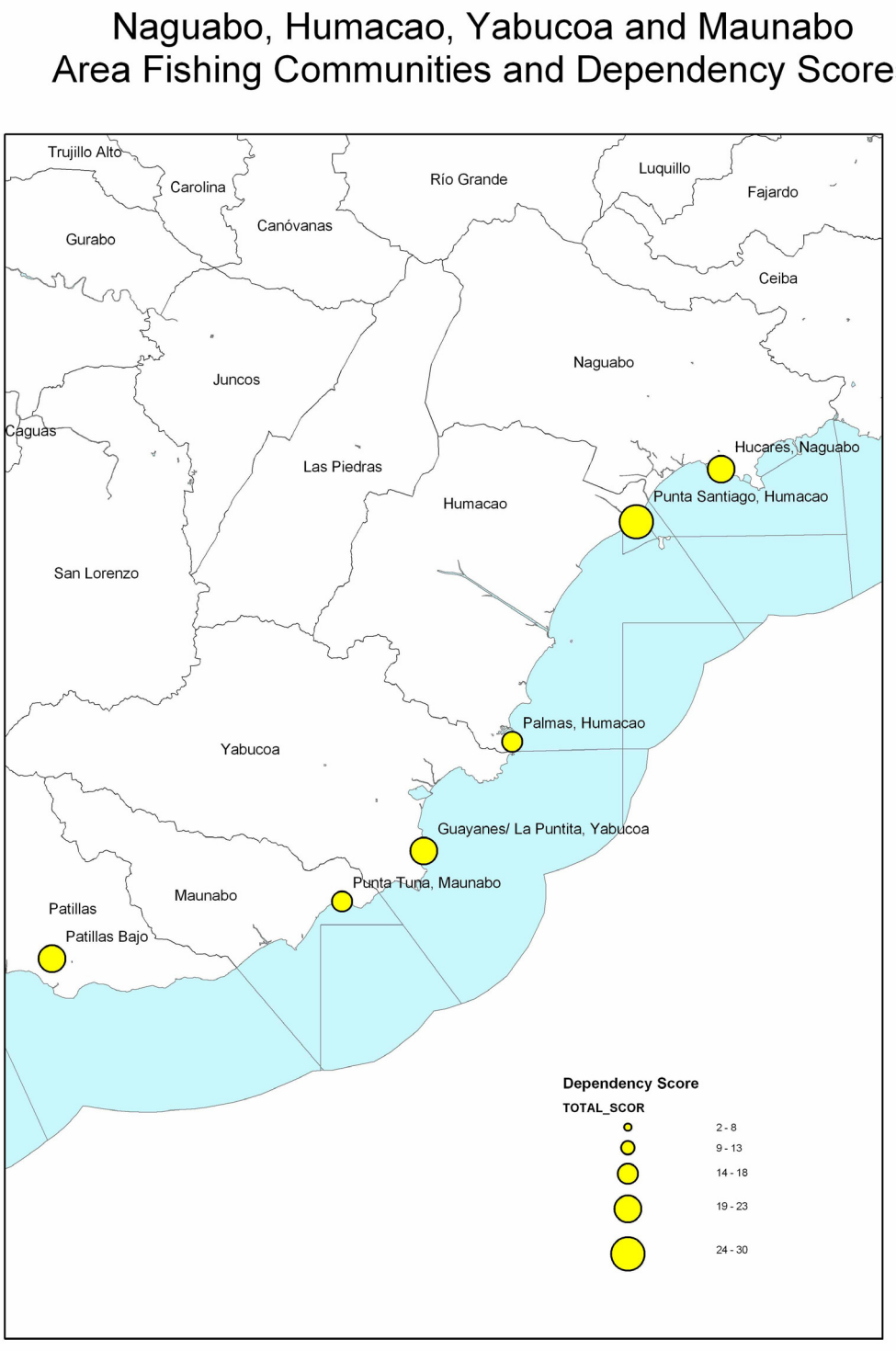
Many fishers from Juana Díaz come from long-time fishing families, skilled at making their own gear and, in some cases, their own vessels, yet few have devoted their lives to the sea on a full-time basis throughout their lives, working as security guards, emergency medical technicians, mechanics, and other positions. Nevertheless, Juana Díaz fishers continue to dedicate themselves to fishing and to pride themselves on providing high quality seafood to the local community.

Southeastern Region:

Naguabo, Humacao, Yabucoa, Maunabo

Southeast Puerto Rico includes an interesting mix of fishing sites and fishing communities nestled in among elaborate residential developments and the infrastructure of contemporary and past industry and commerce. Shell's oil tanks, port facilities, and refineries, for example, sit within a few minutes drive of what has been one of the most ambitious residential and vacation housing on the main island: Palmas Del Mar. In some parts of this region, commercial, subsistence, and recreational fishers have taken advantage of various coastal developments, either enjoying the access that canals, piers, and other infrastructures provide or benefiting economically from the tourist and other traffic through seafood sales and providing services to tourists. Many fishers in this region have been highly active and vocal in their opposition to new regulations, attending meetings, speaking with politicians, and proposing alternatives to current and proposed new laws. Fishing sites here range from the elaborate association at Palmas Del Mar, with its extensive restaurant facilities that draw residents from the residential/ resort complex, to abandoned shipping terminals where recreational fishers fish nearly every day. The facilities at *Villa Pesqueras* across this region suggest relatively robust fishing populations with strong, if irregular, ties to municipal and federal governments and the ability to garner public funds for fisheries infrastructure development. At the same time, the presence of some abandoned fisheries infrastructure and other facilities that experience little use suggests that these ties vary across the region and that their strength changes over time.

Map SE.1. Southeast Puerto Rico



Naguabo

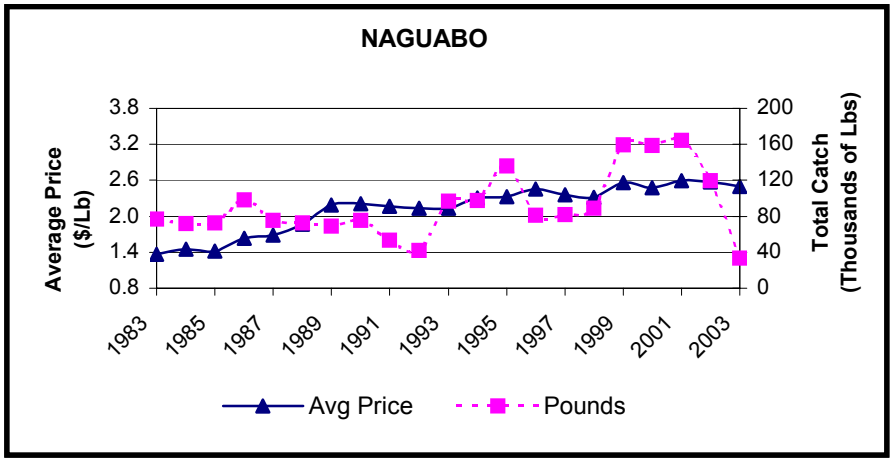
Bordering Ceiba to the south, Naguabo's Húcares and Playa Húcares, within a short drive or boat ride from one another, comprise the municipality's principal fishing community. The community sits on two bays and occupies an area that is somewhat separated from the rest of the municipality by virtue of its location on a point. Part of the community, along the principal coastal highway through Naguabo (route 192) that skirts the Húcares waterfront, consists of a string of popular seafood and other restaurants while other parts consist of areas with elaborate fishing association facilities, seafood markets, and the homes of fishers.

Table SE.1. Naguabo Census Data

NAGUABO	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	21,019	17,195	17,996	20,617	22,620	23,753
Civilian Labor Force (CLF) [2]	5,183	4,200	4,059	5,074	6,541	6,447
CLF - Employed	5,032	3,944	3,881	4,172	4,915	5,059
CLF - Unemployed	151	256	178	902	1,626	1,388
Percent of unemployed persons	2.91	6.10	4.39	17.78	24.86	21.53
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		2,072	640	247	334	73
Construction		424	885	776	747	891
Manufacturing		224	664	740	987	721
Retail trade		308	404	464	490	661
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	25.3	26.0	31.0
Persons who work in area of residence [6]		3,008	1,900	1,811	2,443	1,924
Per capita Income (dollars) [7]			768	1,581	3,221	6,960
Median Household Income (dollars) [8]		738	1,898	4,106	7,763	11,461
Individuals below poverty level [9]			12,840	14,916	14,833	13,051
Percent of Individuals below poverty level			71.35	72.35	65.57	54.94

Unlike most other coastal municipalities, Naguabo has seen increased employment in its retail trade sector as well as its construction. Growth in construction is due in part to coastal development, about which fishers complain. The landings data show Naguabo to be an important landings center, ranking 7th in Puerto Rico over the past five years.

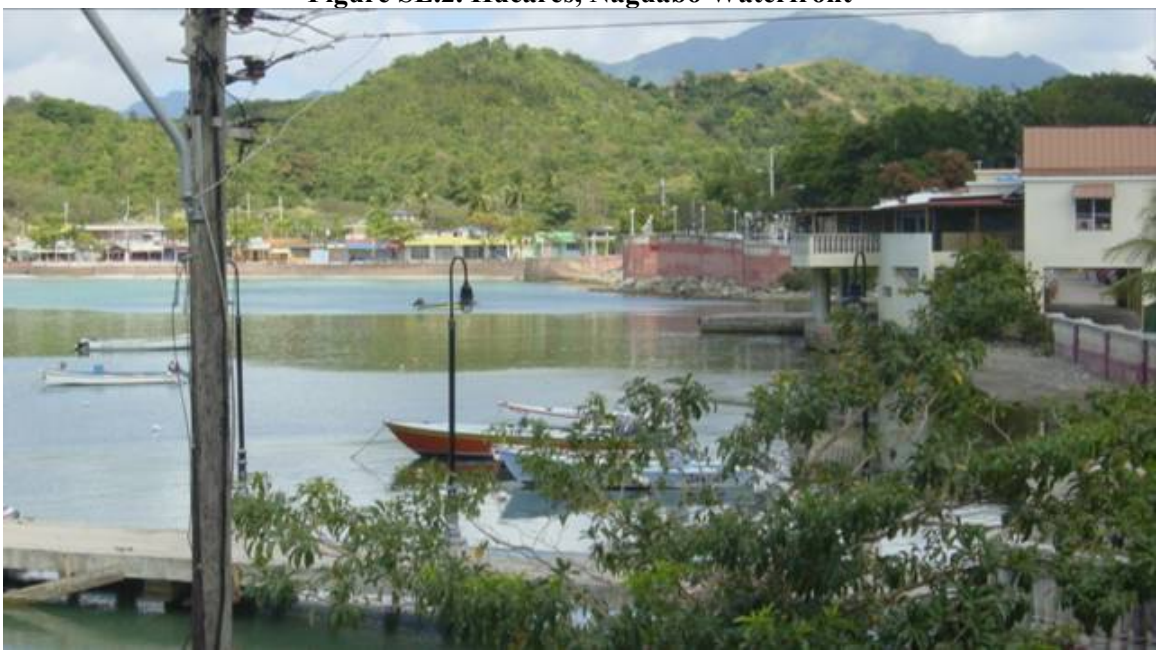
Figure SE.1. Naguabo Landings Data, 1983-2003



These data suggest that Naguabo's landings have been more or less stable over the 20-year period shown here, fluctuating less than landings in many municipalities and accompanied by gradual price increases (correlation coefficient = .4204). The drop from 2002 to 2003 is in line, however, with other places across the islands.

Húcares, Naguabo's principal fishing community, is closely tied to the sea and has recently seen its *Villa Pesquera* refurbished, at Department of Commerce expense, at the cost of $614,000. The facility now has 23 new lockers with louvered doors, at least two concrete, fully enclosed social or communal areas, an office, and a concrete pavilion. It sits beside a ramp and a long concrete muelle that, like much of the waterfront, looks built to last. A long sea wall protects the Naguabo waterfront, extending from the string of restaurants just mentioned to the boat-launching ramp, beyond which is the association.

Figure SE.2. Húcares, Naguabo Waterfront



It is a picturesque waterfront, boasting municipality investment in concrete walks and walls and a large concrete, enclosed area under a building where they advertise boat rides. While this appears to be a municipal facility, there is a seafood restaurant on the second floor of the building. People market

produce and other goods from the open area beneath, though sporadically and on foot, without booths or temporary structures of any kind.

The vessels moored along the concrete pier in Húcares, like boats along other parts of Eastern Puerto Rico, are longer and wider than the 18' vessels in the west. They seem like trap vessels and we photographed some traps inside the fishing association fence. During our first visit to the area we counted between 16 and 20 working boats, although some were in fishers' yards and may or may not have been in service. Another three were inside the association facilities, and another two were moored in a bay around the point from the waterfront, near Playa Húcares.

Figure SE.3. *Villa Pesquera* facility, Húcares, Naguabo

The above photograph pictures the facilities that we noted above have been built recently. Fishers interviewed there reported that they were built just two years ago. The current president of the association is also the president of the *Congreso de Pescadores de Puerto Rico.* This affiliation and the public investment in the facilities suggest that the fishers here, or at least their leadership, are well tied into the island's political network.

Figure SE.4. Naguabo Municipal Building Where They Advertise Boat Rides

Figure SE.5. Boat for Rides, Naguabo

While the photographs above show some tourist development, the waterfront is still more of a working waterfront oriented toward supplying seafood restaurants than one dedicated to tourist activities. Yet fishers at the association did report some moves to integrate more thoroughly with a developing tourist sector in Naguabo, which is growing. Currently, for example, there is a hotel being planned on the waterfront; the people building the hotel approached the association to discuss the possibility of selling them some land and providing boat rides to the tourists who stay there. Whatever openness to these suggestions exists may stem from two sources: first, despite the apparently new and good condition of the facilities, there have been problems with them; and, second, problems with the availability and condition of marine resources—from contamination, sedimentation, and regulation—have led them to begin considering alternative sources of income. These issues are dealt with in more detail below.

Naguabo History

Naguabo is a large, rectangular-shaped municipality that reaches east-west from the coast to the mountains, its narrow edge perpendicular to the coast. Prehistorically and historically, three rivers—Santiago, Blanco, and Daguao—enabled settlement of the Sierra de Luquillo in its interior. These mountains became known as a refuge for native Caribs as early as the 16th century.[14] The coast, by contrast, achieved an early reputation as a part of Puerto Rico's coast most likely to be in the paths of passing hurricanes, which stalled European settlement (Toro Sugrañes 1995: 289). Small numbers of Spanish settled Naguabo as early as 1512, lining the mouth of the Rio Daguao, but their settlements were ultimately destroyed by local Native Americans, and not until 1722 did Naguabo begin receiving sufficient numbers of settlers to establish a town of any significance. Through the 18th century, most settlers came from the Canary Islands, and they founded the municipality of Naguabo in 1794 (ibid.). The original site of the first town, however, was considered too far from the coast, and nearly three decades later, in 1821, they moved the principal population center two miles from the coast.

Most of its 3,078 inhabitants farmed and raised livestock during the 1820s, including the 378 slaves. During this time Naguabo was actually under the political jurisdiction of Humacao, suggesting that, together with Ceiba (formerly under Fajardo's jurisdiction), those in power considered this region of the island incapable of self-government or autonomy. Part of this may have been the region's reputation, during the 19th century, as the site of much contraband trade. This was particularly heavy during prohibition, from 1917 to 1934, when Naguabo's port and beach were heavily involved in the trade of alcoholic beverages.

While sugar was produced at 21 mills in Naguabo, and rum in 5 distilleries, the municipality was also known for its production of livestock and coffee. Livestock production founded a milk industry here in the 20th century, which, along with sugar and small-scale agriculture, provided the majority of the population with employment. While sugar production diminished through this century, beginning with the closure of mills and sugar leaving for *Centrales* in Humacao and Fajardo, milk production continues today, and the region continues to produce beef, pork, and poultry for sale throughout the island.

Tourism is more recent, but Toro Sugrañes writes that Húcares Point, discussed in more detail below, has become its most important tourist destination (1995: 290). The beach on the southern end of Naguabo's coast, between the Blanco and Daguao Rivers, has also become a popular location for weekend tourists. This development has been accompanied by the development of coastal housing and businesses, some of which the fishers view as environmentally unsound.

Fishing from Naguabo

Our interviews with Naguabo fishers revealed that between 35 and 36 bona fide fishers belong to the association, and that all own their own vessels. Around 20 vessels are kept at the association, while others are trailered and launched from the ramp. One Haitian belongs to the association. Census data suggest that association membership is quite high in the municipality, but that levels of fishing effort are variable.

[14] There is much contention over the designation "Carib" and their relationship to the Taino. The word itself comes from transcriptions of Columbus's journals, the more poorly transcribed versions of which became "canib," the root word for cannibal. Some ethnohistorians believe that the Caribs were indeed a different ethnic group, while others argue that the Spaniards lumped all renegade natives of the Caribbean into the category of Carib, leaving the name Taino to refer to those natives who cooperated with the Spaniards.

Table SE.2. Selected Fisher Characteristics of Naguabo Fishers (n=29)

Variable	Response
Association Member	93.1
Hours used for Fishing	
< 20 hours	31.0
20 – 30 hours	13.6
31 – 39 hours	10.3
40 hours	31.0
> 40 hours	13.7
Mean hours	30.24
Standard Deviation	14.394
Minimum hours	0
Maximum hours	54

Source: Puerto Rican Census of Fishers, 2002.

Locals reported that association members are primarily divers, but that they fish with traps and other gear as well, fishing a broad range that extends from off the south shore of Guayama and Arroyo to Fajardo, as far out to sea as the waters south of Vieques. This area overlaps with that fished by fishers of the northeast region, although extending further south. Census data support this, suggesting that they fish primarily the reefs along the continental shelf and its edge, with some oceanic fishing.

Table SE.3. Fishing Locations and Styles, Naguabo

Variable	Percent
Shore	0
Continental Shelf	100
Shelf Edge	100
Oceanic	41.4
Reef Fishes	100
SCUBA Diving	17.2
Skin Diving	0
Pelagic	44.8
Bait	34.5
Deep Water Snappers	31.0

Source: Puerto Rican Census of Fishers, 2002
Totals do not add up to 100% because fishers typically fish multiple locations

Census data also conform, more or less, to our ethnographic observations and interviews in Naguabo. Those we interviewed did seem to view diving as more common than trap fishing, although the census data suggest the opposite, as well as the importance of lines in the fishery. This discrepancy may derive from the fact that it was approaching the conch closure when we visited, and diving activity was frenetic and highly visible, as in Vieques, or from the possibility that diving has gained in popularity in Naguabo in the years since the census. In any case, more individuals engage in trap fishing, as well as fishing with lines, than dive. Divers in Naguabo also reported that they used spears primarily for defense under water, and generally collect conch, lobster, and other species by hand.

Figure SE.6. Fresh Conch Landed in Naguabo on June 18, 2005 (note the rolled-up diver's flag)

Table SE.4. Gear Used by Naguabo Fishers (n=29)

Variable	Percent
Beach Seine	3.4
Trammel Net	3.4
Long Line	13.7
Troll Line	41.4
Fish Trap	72.4
Gill Net	37.9
Cast Net	48.3
Hand Line	75.1
Rod and Reel	3.4
Lobster trap	19.2
Snapper Reel	0
Winch	13.8
Skin	0
Spear	20.7
Lace	20.7
SCUBA	19.2
Gaff	79.3
Basket	0

Traps accounted for slightly more than 45% of the gear reported in the landings data since 1996 as well, while diving, the second most commonly reported gear, was just under 30%. Triangulating ethnographic, census, and landings data confirms that traps and diving are two most common gear types in Naguabo, although their use varies through the year. Similarly, landings and ethnographic data tend to agree that, with this gear, Naguabo fishers target, first, lobster and conch, and second, pelagics such as sierra and deep water snapper and grouper species (commonly known as "first class fish"). When they dispose of conch shells, they place them with their openings downward, believing that the presence of many obviously emptied shells repels live conch. Fishers here also believe that the leaving the conch shells is good for the life of the reef, offering protective locations for juvenile species.

Marketing of fish in Naguabo is flexible, with the association playing a role in marketing without monopolizing the catch. Trucks from the municipality center of Naguabo, as well as San Juan, Caguas, Yabucoa, and Cayey, visit Húcares to buy their catch, and the fishers here also sell to the restaurants that line the waterfront. A second line of restaurants, opposite the beach on the southern end of the municipality, also purchase fish locally, although Punta Santiago, in Humacao, is closer to these establishments than Húcares. Still, fishers reported that tourists buy their seafood from these kiosks near the beach. Census data reveal that marketing in Naguabo is in fact quite varied, and that the association accounts for only about half of fishers' sales.

Table SE.5. Marketing Behaviors in Naguabo (n=29)

Marketing Behaviors	Percent Reporting
Fish dealer/ buyer	20.7
Association	51.7
Street vending	13.8
Restaurant	10.3
None	17.2
Sell fish gutted	13.8
Keep fish on ice	79.3

Source: Puerto Rican Census of Fishers, 2002

The apparent high levels of association membership combined with less than full use of the association as a market reflects some of the problems the association has been having. Despite the newly constructed facilities, the association has yet to utilize its resources fully. For example, although it has a diesel-powered generator, this has only been used once. Other equipment—freezers, fish processing equipment—likewise sits idle. One of the walls near the facility is considered poorly engineered and unsafe, and poor planning also resulted in too little parking for members who launch their boats from the ramp.

Exacerbating problems internal to the association are common external factors: contamination of marine resources, fish imports, problems with fish stocks, seasonal closures, size limits, and so forth. They expressed more dismay with seasonal closures than fishers elsewhere, suggesting they may be adversely affected by them; similarly, they believe that size limits are too strict. In as much as changing fish regulations cut into their incomes, they believe they should be compensated, either directly through subsidies or through tax breaks. This is doubly serious at the current time because they are feeling the bite of imported fish, some of which are fish that they are restricted from catching but that are being caught elsewhere, or by fishers from other countries, and then being sold here. They said that they had participated in studies of fish stocks, aiding the government, but that this information had been used against them at the very time the government was issuing permits for mangrove destruction for new construction.

As noted earlier, tourism is increasing in Naguabo, stimulating new construction along and near the coast. This has led to fresh water shortages for the mixing of cement. Fishers have noticed the clearing of mangroves and other forested areas and, from this, they perceive sedimentation that has been particularly damaging to coral reefs. They also list factories, naval vessels (including a submarine), and cargo ships among the polluters in the area. They see the decline in mangroves and the decline in coral reefs as going hand in hand. Nearly a quarter see pollution as a problem, and one in ten view habitat destruction a primary cause of declining fish stocks, with more citing overfishing. None in the census believed fish stocks were getting better, and slightly more than half believed they were now worse than previously.

Table SE.6. Opinions of Naguabo Fishers Regarding Fishery Resources (n=29)

Opinion	Percent Reporting
Status of Fishery Resources	
Better	0
The same	48.2
Worse	51.7
Reasons for problems in fisheries	
Pollution	24.1
Habitat Destruction	10.3
Overfishing	17.2
Laws, regulations, and licensing	3.4
Crowding	0
Seasonal factors	0

Source: Puerto Rican Census of Fishers, 2002

Summary

As Naguabo's only fishing community, Húcares has had its successes and failures in recent years, securing funds for new construction of association facilities yet still finding some components of these facilities inadequate to their needs. Their attention to the problems with mangroves and coral reefs, and their concern with fish stocks, demonstrates close and repeated interaction with the region's marine resources, an indication of fishing dependence. Equally important, they trace causal relationships between sedimentation and pollution, deteriorating water quality, and a changing species mix and abundance, recognizing the systemic dimension of local ecology.

Several other factors suggest a dependence of fishers in Húcares on fishing and the fishing way of life. They descend from boat-building and gear-building traditions and continue to use these skills today, supplementing them with purchased materials. They also report that they learned the trade from other family members and have been actively trying to reproduce the lifestyle by teaching the youth of the community. Unfortunately, they report that some youth in the community find it easier to migrate toward drug trafficking as fishing becomes less economically feasible.

Humacao

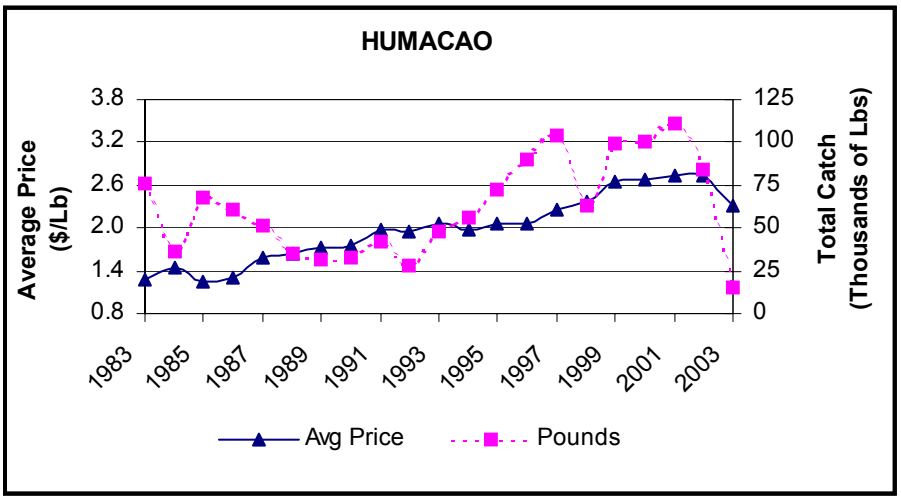
Probably best known for Palmas Del Mar, the residential and country club development on the municipality's southern coast, Humacao is also home to two significant fishing sites: Punta Santiago, a fishing community near its border with Naguabo that is important to the recreational, subsistence, and commercial fishing populations of the region; and the *Villa Pesquera Palmas Del Mar*. Inside the border of Palmas Del Mar, the *Villa* has been successful first in resisting displacement from the elaborate development surrounding them and second, as noted earlier, in taking advantage of the wealthy clientele that live in and visit the homes, golf courses, marinas, and other amenities of the gated complex. In this sense they are like La Guancha—a network-based community that has used its group membership to vertically integrate with tourism. Despite that it attracts residents from the condominiums and other luxury residences, the distinction between the commercial landing center and the gated complex is abruptly apparent as one passes by the convenience store serving the Palmas Marina and enters the fishing association's grounds: immediately the road changes from smooth, lined asphalt to rutted dirt.

Table SE.7. Humacao Census Data

HUMACAO	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	34,853	33,381	36,023	46,134	55,203	59,035
Civilian Labor Force (CLF) [2]	9,190	7,748	8,753	12,300	18,144	17,345
CLF - Employed	8,753	7,164	8,241	10,559	14,559	14,115
CLF – Unemployed	437	584	512	1,741	3,585	3,230
Percent of unemployed persons	4.76	7.54	5.85	14.15	19.76	18.62
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		2,272	878	238	332	118
Construction		580	1,368	804	1,319	1,501
Manufacturing		1,204	1,583	2,919	3,719	2,947
Retail trade		676	1,013	1,131	1,967	1,514
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	23.7	20.7	25.0
Persons who work in area of residence [6]		5,784	5,691	6,706	10,584	8,853
Per capita Income (dollars) [7]			832	1,849	3,955	7,677
Median Household Income (dollars) [8]		814	2,153	4,650	8,930	14,345
Individuals below poverty level [9]			24,134	30,774	32,289	27,690
Percent of Individuals below poverty level			67.00	66.71	58.49	46.90

Humacao has a fairly large and bustling metropolitan area with considerable employment in manufacturing, construction, and retail trade. It also has a robust tourist sector with *Palmas* and two other beach areas—one a state-owned facility with inexpensive cabanas for rental. This economic profile is reflected in the above table, with somewhat lower levels of unemployment and poverty than one finds in most other coastal municipalities. Its fishery statistics, as indicated by the figure below, place it 14th out of the 41 reporting municipalities.

Figure SE.7. Humacao Landings Data, 1983-2003



Humacao History

Like Naguabo, the position of Humacao, at the doorway of most hurricanes that hit Puerto Rico, stalled large-scale settlement until the early 19th century. Its name derives from a Taino cacique named either Jumacao or Macao, whose people occupied the region when the early Spanish settlers arrived, in 1722. Also like Naguabo, these early settlers came primarily from the Canary Islands and established themselves in sufficient numbers that by the end of the 18th century, some time between 1780 and 1794 (historians are unclear exactly when), they achieved the political designation *pueblo* (small town). Slightly more inhabitants were here in the early 19th century than in Naguabo, 4,713, of whom 415 were slaves (Toro Sugrañes 1995: 197). In 1828 they received the title of "district," which had military and administrative implications, signaling a tighter tie to the central locations of empire. By the end of the 19th century they were growing more rapidly than the other municipalities in the region; by 1898, Humacao's political power extended all up and down the east coast and over some of the south coast of Puerto Rico, from Fajardo to Salinas. During this early period, residents supplemented sugar and livestock production with tobacco, which grew well in Humacao's river valleys.

During this century Humacao has continued to grow, suffering one major setback in 1956, when Hurricane Santa Clara devastated much of the municipality, including many residents houses, bridges, and roads. By 1962, however, it was growing again, with a regional college on the edge of the capitol city becoming affiliated with the University of Puerto Rico system. By the 1990s, with some 38 factories and a diverse economic base, it had become the 12th largest municipality in Puerto Rico.

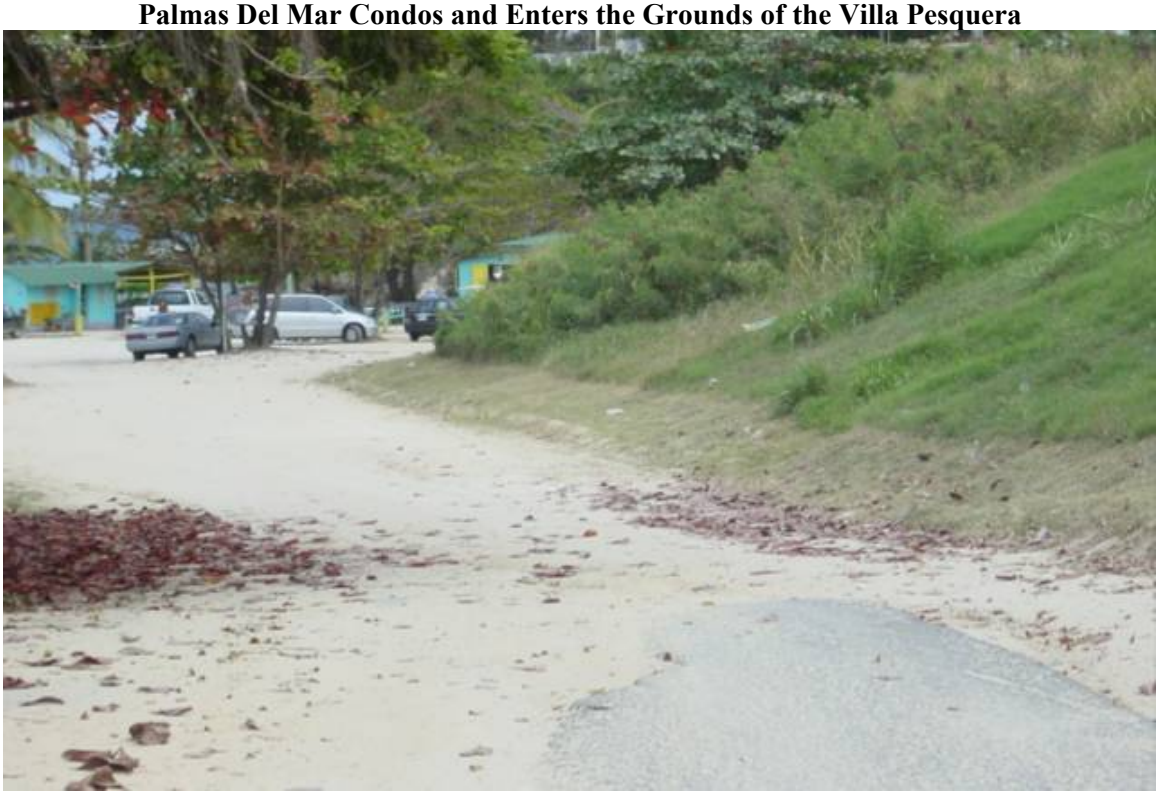
Fishing from Humacao

Villa Pesquera Palmas Del Mar

In the opening paragraph of this segment, we were careful not to call this *Villa* a fishing community. While it is one of the more significant sites of Puerto Rican fishing, the *Villa* is a landing center surrounded by one of the most developed gated communities in Eastern Puerto Rico. It sits at the southern end of the municipality's coast, near the border with Yabucoa, and the fishers here share many of the same opinions and problems with their neighbors to the south. The gated community has a golf course, a marina, an equestrian center, a nature reserve, a supermarket, 26 restaurants, 2 hotels, 42 "communities" (the gated within the gated), a country club, a racquet and fitness club, and a private

security force. Signs on the *autopista* running north-south along Puerto Rico's east coast advertise Palmas, and a long, nicely paved lane dotted here and there with professional landscaping leads from the highway to a guard station where visitors check in. People visiting the fishing association are given a pass, a map, and directed to the association's facilities. Signs deep inside the compound pointed to a marina and a Fishing Village (in English), but, as noted earlier, the nice pavement ended just before the Villa Pesquera de Palmas Del Mar:

Figure SE.8. Pavement Becoming Sand & Dirt Road as One Leaves Palmas Del Mar Condos and Enters the Grounds of the Villa Pesquera



Nevertheless, it is a testament to the power of the Villa that it has survived development on such a massive scale. Indeed, it not only survives, it has taken advantage of the residents, both permanent and seasonal/ tourist, to serve in its restaurant. Some of the families who eat there arrive in golf carts and speak only English. (It is common, of course, for people in communities of this type to own their own golf carts for both golf and transportation around the grounds; Palmas literature that they distribute at the main gate and elsewhere around the compound advertise golf cart sales). In the brochure advertising Palmas they list 25 restaurants; the Villa Pesquera's isn't named, nor is it mentioned elsewhere in the brochure. Yet it survives and perhaps even flourishes from some of the wealthy traffic.

The restaurant facilities are more extensive than most other Villas Pesqueras, with outdoor seating for upwards of 50 people, a full kitchen, and display cases that are maintained with a discriminating clientele in mind. They do a brisk lunch business as well as sell fresh fish. The fishers' lockers and other equipment extend from the back of the restaurant.

Figure SE.9. Seafood/Empanadilla Counter in Villa Pesquera de Palmas Del Mar

People interviewed at the Villa reported a membership of 30 fishers, who fish mostly with fish traps, lines, and SCUBA equipment. Recent landings data (2000- 2003) for Humacao confirm this, with 47.5% of landings caught with fish pots, 36% with bottom lines, and 13.2% by SCUBA diving. Census data show similar gear types, which they use to target lobster, yellowtail snapper, grunts, mackerel, and box fishes. The fishers' vessels, like others of the west coast, are larger than the yolas of the west, more like 25 feet than 18, and wider, as the pictures below depict.

Figure SE.10. Commercial Vessels at Villa Pesquera Palmas Del Mar (see condos in background)

Figure SE.11. Traps at Villa Pesquera Palmas del Mar

Figure SE.12. Lockers at Villa Pesquera Palmas del Mar

Clearly they have a ready customer base for the association's seafood sales, and 70% who answered the census reported that they sold to the association. Another advantage to occupying this space is, like La Guancha in Ponce, it is a sheltered location for their vessels, the inlet stabilized with a jetty, and other infrastructure (e.g. diesel sales) that will are unlikely to close or fall into disrepair because of the marina traffic. The marina itself, which adjoins the Villa's grounds, is upscale, with yachts and some fishing vessels that may be recreational fishers, but more commonly the kind used by deep water sport fishermen who fish for the big game fish (marlin, swordfish, etc.). The marina has a store like a convenience store attached to it, and plenty of parking. They also have a dry dock storage facility.

Figure SE.13. Sign at Villa Pesquera de Palmas del Mar Advertising in English & Spanish

Figure SE.14. Marina Adjacent to Palmas *Villa Pesquera*

We discuss the problems voiced by Palmas del Mar fishers in more detail in the section on Yabucoa, which adjoins Humacao to the south. At the association in Yabucoa, La Puntita, we held two group interviews (impromptu focus groups); at one was the president of the *Villa Pesquera Palmas Del Mar.* Here, between discussions of the two significant sites, we present census data on Humacao, including their views of the islands' fishery resources.

Table SE.8. Fishing Locations and Styles, Humacao (n= 50)

Variable	Percent
Shore	10
Continental Shelf	86
Shelf Edge	12
Oceanic	42
Reef Fishes	90
SCUBA Diving	18
Skin Diving	10
bPelagic	44
Bait	78
Deep Water Snappers	42

Source: Puerto Rican Census of Fishers, 2002
Totals do not add up to 100% because fishers typically fish multiple locations

Table SE.9. Selected Humacao Fisher Characteristics

Variable	Response
Association Member	92
Hours used for Fishing	
< 20 hours	4
20 – 30 hours	22
31 – 39 hours	16
40 hours	54
> 40 hours	4
Mean hours	35.42
Standard Deviation	7.877
Minimum hours	6
Maximum hours	48

Source: Puerto Rican Census of Fishers, 2002

Table SE.10. Gear Used by Humacao Fishers

Variable	Percent
Beach Seine	18
Trammel Net	18
Long Line	18
Troll Line	62
Fish Trap	72
Gill Net	36
Cast Net	80
Hand Line	92
Rod and Reel	14
Lobster trap	0
Snapper Reel	10
Winch	10
Skin	0
Spear	22
Lace	22
SCUBA	18
Gaff	78
Basket	2

Table SE.11. Marketing Behaviors of Humacao Fishers

Marketing Behaviors	Percent Reporting
Fish dealer/ buyer	6
Private	0
Association	70
Street vending	24
Restaurant	6
None	34
Sell fish gutted	6
Keep fish on ice	64

Source: Puerto Rican Census of Fishers, 2002

Table SE.12. Opinions of Humacao Fishers Regarding Fishery Resources

Opinion	Percent reporting
Status of Fishery Resources	
Better	2
The same	80
Worse	18
Reasons for problems in fisheries	
Pollution	10
Habitat Destruction	8
Overfishing	4
Laws, regulations, and licensing	0
Crowding	2
Seasonal factors	2

Punta Santiago

Situated within a stone's throw of the border between Humacao and Naguabo, on the northernmost section of Humacao's coast, Punta Santiago was the site of a short ethnographic study in the mid-1980s (Cruz Torres 1985). The title, *La Comunidad Pesquera de Punta Santiago*, accurately designates the town as a fishing community, a designation that continues to the present. Residents of Punta Santiago enjoy not only the presence of a viable *Villa Pesquera*, but across from the Punta Santiago post office a recreational pier stretches away from the grounds *Villa*, the end point of a string of boats tied to informal landing centers extending from near the Playa Punta Santiago (just north of town) to the municipal pier. The pier itself looks like it was quite an investment of public funds, from which recreational/ subsistence fishers land several species of fish. Those interviewed reported catching shark and mutton snapper. The photographs below depict the community's varied fishing infrastructure.

Figure SE.15. "Pescadería Geño" — Informal Landing Center Near Playa Punta Santiago (see Caya Santiago in the background)

Figure SE.16. Muelle at Punta Santiago (man in center well is netting bait with *atarraya*)

The first time we visited Punta Santiago, two men were working at the *Villa Pesquera de Punta Santiago.* One, the association president, said there were 20 members, and at the time of our visit he and the other man working with him were engaged in two tasks: packaging ballyhoo for bait and cutting up small *sierra,* which he said they sold as food. They catch them with nets, he said, and some of the big nets were scattered around the grounds, but there were traps there as well, and census and landings data both suggest that traps continue to be the most important gear in Punta Santiago. This was true when Cruz Torres conducted her research here in the early 1980s. "In this community the fishers utilize mainly the trap as fishing gear," she wrote. "They also utilize lines (*el cordel*), beach seines (*chinchorro*), cast nets (*atarraya*), and one fisher devotes his time to fishing by diving" (1985: 4). Since her study, diving has increased in importance in Punta Santiago, as across the islands, while traps and lines remain important.

Cruz Torres also reported that slightly under half of the fishers she interviewed in the mid-1980s engaged in other economic pursuits to supplement fishing incomes, including agriculture, boat-building, and

construction and mechanic work. Others had worked in the past, mostly in agriculture. Half were born into fishing families, and the majority characterized fishing as a labor of love that nevertheless required hard work, sacrifice, and the ability to take risks. Those fishers who did take risks were perceived by others to be the more successful fishers.

Figure SE.17. Villa Pesquera Punta Santiago (barely visible, at the point of the boat on the right, is an altar to the Virgen del Carmen)

Figure SE.18. Fishing and Recreational Boats Stored at Villa Pesquera Punta Santiago

Again, like Húcares, Playa Santiago is a fishing community with multiple attachments to the sea. It includes a long, narrow neighborhood where many of the houses have some involvement with marine resources, including providing bait and other services to recreational fishers (both those who use the municipal pier and those who are sportfishers). One individual, for example, advertises *jueyes* (land crabs) among sales of a variety of fish and seafood products, including bait, and has his own boat in his yard. The fishing association packages ballyhoo for big game fish, and they also allow some sport and recreational vessels to use their facilities in some capacity, including storage.

Figure SE.19. Yard in Punta Santiago, Advertising Fishery and Other Products

Figure SE.20. Ballyhoo Being Processed, Villa Pesquera Punta Santiago

A sign on the fence of the association advertises romantic cruises on Friday and Saturday nights that leave from the pier, indicating other kinds of ties to the community. On weekend, the beaches to either side of the pier are crowded with bathers and people selling pinchos, pina coladas, empanadillas, etc. Jet skis ply the waters near shore. The Villa Pesquera operates a small restaurant that sells seafood empanadillas and beers to people visiting the beach and to association membership. When Cruz Torres was conducting her

research, the association had just been founded and was getting off to a rocky start. Fishers founded the association in response to increasing seafood demand, in part stimulated by the growing tourist traffic to the community's beaches. The original facilities were located in an old school and only 10 of the 19 fishers she interviewed belonged to the association. At the time, at the top of their list of problems was a lack of help from the government, followed by contamination of the resource from factory production, poor port facilities, and a lack of freezers (1985: 4-5). Combined with the small vessels they were operating at the time, these problems constrained their fishing activities to daily excursions in the waters between Yabucoa and Vieques.

Figure SE.21. Recreational Fishers at Punta Santiago Municipal Pier, Sunday, Father's Day, 2005

There are at least four upscale seafood restaurants in the town, along main street, and about twice that many smaller places selling fish dinners and seafood empanadillas. At one of these I asked the owner where he bought his fish, and he said the local *pescadería/ Villa Pesquera.* In addition to the association, there are other seafood markets in the town as well. The local hardware store sells fishing equipment along with its other hardware. All of these features indicate a fishing-dependent community. In addition to the 20 or so members of the association, at least another ten families depend on the fisheries to serve their restaurants and many use the pier and recreationally/ subsistence fish on a daily basis. The evident improvement and public investment in fishing infrastructure since Cruz Torres's ethnographic account suggests that the state has recognized fishing's importance to the community.

Yabucoa

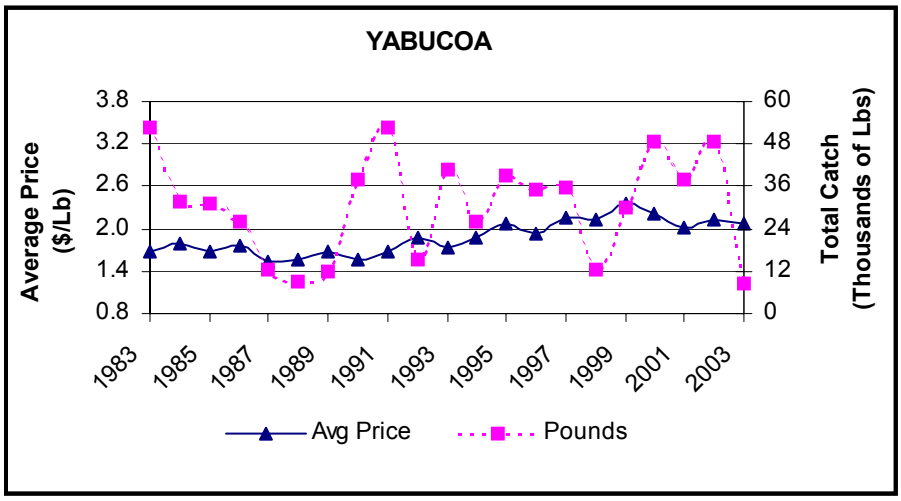
Over the years, the commercial traffic in and out of Puerto Yabucoa has created the ruins of warehouse and milling facilities along with working refinery ports that have benefited local recreational/ subsistence fishers while creating some problems for the associated commercial fishers of La Puntita, Yabucoa's *Villa Pesquera.* The municipality is blessed with two large beaches and several smaller access points where fishing takes place on a regular basis; near one of the beaches is a quiet, nice, but fairly isolated parador called Palmas de Lucia, and near this stand what appear to be abandoned facilities of a former *Villa Pesquera*.

Table SE.13. Yabucoa Census Data

YABUCOA	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	28,810	29,782	30,165	31,425	36,483	39,246
Civilian Labor Force (CLF) [2]	7,109	5,652	5,227	6,816	10,455	9,498
CLF – Employed	7,006	5,444	4,999	5,493	7,980	7,242
CLF - Unemployed	103	208	228	1,323	2,475	2,256
Percent of unemployed persons	1.45	3.68	4.36	19.41	23.67	23.75
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		3,036	828	287	333	178
Construction		224	1,219	230	691	749
Manufacturing		644	947	2,000	2,393	1,749
Retail trade		464	475	577	970	583
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	23.4	25.8	29.2
Persons who work in area of residence [6]		4,680	3,661	3,230	4,668	2,777
Per capita Income (dollars) [7]			496	1,420	3,045	6,125
Median Household Income (dollars) [8]		506	1,341	4,136	7,808	12,292
Individuals below poverty level [9]			26,500	22,957	24,381	21,325
Percent of Individuals below poverty level			87.85	73.05	66.83	54.34

Yabucoa's economic profile is more or less in line with other coastal municipalities: high rates of unemployment and poverty, long average commute times to work, with declining industrial sectors in all but construction. Against this background, Yabucoa's fishers provide an important source of income, despite that it ranks only 25th in the landings data.

Figure SE.22. Yabucoa Landings Data



The current commercial fishers of Yabucoa are among the most politically engaged in Puerto Rico and genuinely interested in addressing the problems they perceive with new fisheries regulations; their leaders routinely meet with politicians and officials in the Department of Agriculture, and attend public hearings about the islands' fisheries. They are politically aligned with members of the *Villa Pesquera Palmas del Mar,* possibly in part because their facilities are close to one another: Palmas sits near the southern border of Humacao, north of Yabucoa, and La Puntita sits near the northern border of Yabucoa, south of Humacao. Like other east coast fishers, they have access to some of the most productive waters of Puerto Rico, yet the proximity of the south coast also opens up other territorial alternatives to them.

Yabucoa History

Though part of the dominion of Güaraca, a Taino cacique, Spanish intrusion into Yabucoa occurred even later than in other southeastern municipalities. Not until 1793 was Yabucoa founded, and because its original city was situated in a river valley prone to flooding, Yabucoa didn't begin to increase in size until the 19th century. In 1828 there were under 5,000 inhabitants, and over the next seventy years this did not even triple in size (Toro Sugrañes 1995: 423).

"Yabucoa always has been know for its great production of all types of livestock," writes Toro Sugrañes (ibid.). "Also it has good fishing from Guyanés Beach [where the current fishing association is located]." That Toro Sugrañes mentions fishing in his capsule history of Yabucoa is important, in that his coverage of municipality histories is relatively brief.

Added to this economic mix was tobacco, which was important in Yabucoa from the 1920s to the 1950s, and, more importantly, sugar. Sugar milling and refining lasted longer in Yabucoa than in other municipalities, and its importance is still recognized in an annual Festival of the Cane. It still had a refinery when Toro Sugrañes was writing in the 1990s, although at that time the petroleum industry had begun to establish a foothold in the area. The port of Yabucoa became an important port for importing petroleum for Sun Oil and later Shell refineries, which persist today.

Tourism has not been a major force historically in the municipality, although its beaches and its guesthouses are becoming increasingly popular today.

Fishing from Yabucoa

Blessed with a number of recreational fishing sites as well as a politically active fishing association aligned with the fishers of Humacao, Yabucoa's fishing profile is varied and complex. Below we describe one recreational fishing location that has developed from the ruins of abandoned shipping infrastructure yet which takes advantage of the fact that a working port maintains the canal where people fish. Reliance on both old and new, abandoned and functioning infrastructure, reflects the status of recreational and subsistence fishing in Puerto Rico as an activity that takes place in the interstices of outdoor life, with gradients from professional sportfishing to the casual recreational fishing with the beer can portrayed in the history section above (Griffith, et al. 1988).

Recreational Fishing Site

This area is an ex-shipping/ loading center with large abandoned warehouse-like buildings and a conglomeration of chutes and storage bins that resemble a feed mill. It might have been an old facility for processing and/or loading agricultural produce, such as sugar or bananas, both of which grow here (now in reduced quantities than formerly). Surrounded by a chain link fence, it is nevertheless open and the guard station is unmanned. The fence and guard station are overgrown with vines. Recreational fishers fish all along the bulkhead where, in earlier times, large vessels moored. Across the water was the kind of vessel we imagine used to tie up here: ocean-going barges, as in the following photo:

Figure SE.23. Barge Anchored across from Recreational Fishing Site, Yabucoa

The barge across the channel was docked at a Shell Oil refinery that is still in operation and that takes up most of the rest of the area. Across the road from the abandoned area is a dirty beach that may be used by drug users or dealers and such, as its garbage heaps contain needles and other drug paraphernalia, and it is fairly isolated, down a road leading into the ocean. Brief interviews with recreational fishers at this site revealed that they caught "todo" (everything) here, including *tiburón*. Those we observed used shrimp for bait and fished with multiple poles.

Figure SE.24. End of the Bulkead from which Recreational Fishers Fish (notice the refinery tanks in the background and the mooring for ships in the foreground)

Abandoned Villa Pesquera

Not only have the agricultural loading companies abandoned their infrastructure, the two photos taken near the Parador Palma de Lucia show that fishers too seem to have abandoned their facilities. The juxtaposition of these two cases of abandonment certainly must carry some symbolic weight in changes taking place along these coastlines. Not only small-scale fishing activities but also large corporate firms have been driven from production, dilemmas for both moral economies and capitalist systems.

This part of the coast has been gentrified for some time, with several places catering to both seasonal home buyers and tourists. There is a great deal of construction going on, yet there are far fewer of the roadside food stands that Griffith and Valdes Pizzini reported some years ago (2002). Most have been replaced, or displaced, by seafood restaurants.

Figure SE.25. Abandoned Villa Pesquera, Yabucoa

Figure SE.26. Abandoned Pescadería in Villa Pesquera, Yabucoa

La Puntita: Functioning Yabucoa Villa Pesquera

This facility is off highway 906, between Playa de Guayanes and Punta Guayanes, just around the point, south, from Palmas del Mar in Humacao. It is a functioning association, with a pescadería and a muelle

along with several fishing boats and new traps. On our first visit the seas were rough, with westerly winds blowing hard towards the shore, and there was little activity. Several boats were moored there. One man was fishing recreationally from the shore near the facility, but otherwise there were only four men socializing under a small tent.

Figure SE.27. La Puntita (The Little Point) Fishing Association

Figure SE.28. Recreational Fisher Checking His Bait Traps from the Pier at La Puntita

Figure SE.29. Yolas at La Puntita

Figure SE.30. Fish Traps at La Puntita

On our second visit we were much luckier in terms of interviews, conducting an impromptu focus group with the Association President, the Treasurer, an outspoken member, and two other fishers, one elderly and one around 50, the latter carrying a clipboard. They reported that this is the only Villa Pesquera in Yabucoa, and they have 18 members. From the gear scattered around, they looked like primarily line and trap fishers, which we later confirmed was the case. The Villa does have a pescaderia, however, lockers, a pier, and other facilities. It also handles fishers' Social Security records and other benefits and is run,

they reported, by three people: a president, a treasurer, and a third (possibly a secretary). The association also has a restaurant that is run by family of the membership and which competes with others in Yabucoa: in particular, the scenic coastal road between Yabucoa and Maunabo has at least four upscale seafood restaurants that overlook the sea. Our experience at this association, with the second and third visits, was remarkable enough to describe it in detail. Griffith visited by himself the first and second times, returning on a third visit with Carlos Garcia Quijano for more in-depth interviewing. Griffith's field notes record the meeting as follows:

"When I first arrived and told them I was writing a report about Puerto Rican fishers, and that I was working with Sea Grant and with NOAA, Geño (pseudonym) said, 'We've been waiting for you,' and led me to a shaded table where the others gathered around. He slapped a copy of Ley 278 and the DRNA Regulations down in front of me and, indicating first the regulations and then the law, he said, "We've been trying to get these [the regulations] changed for 10 years, but first we have to change this [the law]." Evidently the latter gives authority to the former.

Geño and the others believe that NOAA seems to be trying to turn the entire island of Puerto Rico into an "aquarium"—that is, a sanctuary. They have had problems most immediately with the vedas, because there are so many of them: he said for sama, for sierra, for jueyes, etc. This results, said the treasurer, in "Reduce salario…" (Reducing pay).

Geño said, however, that "Cada pescador tiene una problema diferente." (Each fisherman has a different problem), although they were in agreement on a few issues:

- *Like fishers in Naguabo, they said that if the government wanted to close the fisheries for a few weeks, they should compensate them for the loss of income. The catch to this plan, he said, was that "instead of 18 bona fide fishermen, there would be 100 here saying they were fishermen."*
- *They believe that NOAA gave $50,000,000 to the government of Puerto Rico to make the entire island a sanctuary. They prefaced this statement with, "The problem is, NOAA is rich and the fishermen are poor." The Puerto Rican government is supposed to be distributing the 50 million to fishermen, but they haven't seen a penny. They said that not too many people know about this, and that the government wants to keep it quiet, suggesting that it is a conspiracy.*[15]
- *They agreed that Dr. Martin, the head of the association at Palmas del Mar, has written a very good proposal to deal with the regulations.*
- *Japanese long-liners off the coast of Puerto Rico, in international waters, are taking a greater share of the catch than they (the Puerto Rican fishers) can. Puerto Rican fishers have to leave every morning at 3:00 am and return by 12:00 noon, because if they get caught out at sea in one of those little 18' foot boats, it's dangerous.*
- *The lanchas from the Shell refinery, just down the coast, cause problems when they pass, cutting lines, spilling oil, etc. There was recently a huge fish kill in one of the rivers that the government wanted to keep quiet: they believe it was related to the refinery.*
- *Licenses can be a problem: almost none of the older fishermen have the kinds of information (or plans) that they need for licenses.*

They are actively involved in the political process. Geño himself went to the president of the senate, a man named Javier Vizcarrando Colondrió, and he had his card stapled to the law 278. In addition, he's on a "junta," a group that has been trying to change the law, and he is attending a meeting this coming Friday to solicit aid in their struggle from the Department of Agriculture.

[15] It should be noted that conspiracy theories are common among fishers and others who believe that they are being marginalized or forced out of existence, such as small farmers. Griffith (1999) extended discussion of conspiracy theories among Mid-Atlantic coast fishers offers some explanation for this.

Across the bay there is a large building that he said was a fish hatchery. They are involved in that as well as in a project to protect the mangroves. They have worked closely with Walter Padilla and others at the Department of Agriculture. They had a list of all the Villas Pesqueras in Puerto Rico, some of them highlighted in yellow, that Padilla had produced for them, and they described Padilla as "pro-pescador" (for the fishers)" (Griffith's field notes, June, 2005).

On the following visit to La Puntita we were able to flesh out some of the above themes as well as address others. Again, this was a focus group, although this time it included different members of the association as well as a high ranking official in the Villa Pesquera Palmas Del Mar. Again, Griffith's field notes record the focus group in detail:

"Carlos & I spent a wonderful three to four hours at this Villa Pesquera, *where when we arrived several fishermen and a teenager were munching on a communal plate of fried fish: sierra, mostly, their most prized species, and a smaller whitefish, possibly snapper. They offered us some. The communal spirit of this initial impression was typical of the entire day, with many fishers coming and going, ordering drinks, sharing ideas, and sharing more plates of fried fish, empanadillas, and the like. A woman cooked, and another teenaged boy assisted her; later they said she was a full-fledged fisher herself, with a commercial license.*

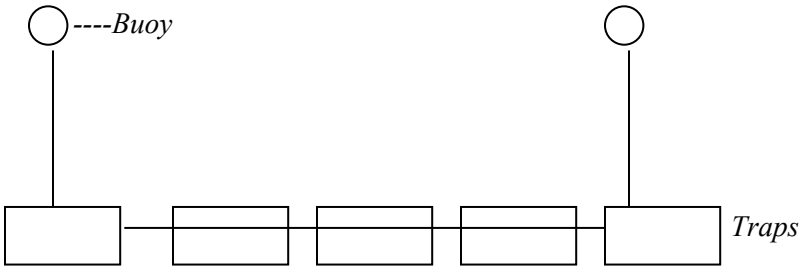
Today, like the other day, became an impromptu focus group, with primarily two fishers and eventually three. The president was there, but joined and left the group from time to time, tending to the pescadería when there were customers and replenishing the fish supplies at the restaurant. The restaurant has but three tables—long as picnic tables, with seating for around six at each.

Several important themes emerged again and again:

- Conocimiento: *Fishers' knowledge. They kept contrasting the knowledge of "the field"* (el campo)*—by which they meant experiential knowledge from fishing—to the knowledge of the biologists and the DRNA people. [This use of the word "field," as in field knowledge, is interesting in light of what we are doing as anthropologists, and it resonates with sentiments of fishers in Rincón, who suggested that one needed to get out into the field to understand what was going on—that you couldn't just look at the landings data and extrapolate from that… As important, field knowledge implied superior knowledge based on repeated, daily, lifetime observations, similar to anthropological fieldwork that tends to be longer than sociological or economic field work and based on direct observation.]*
- *The market. Following from what they said above, they said that they knew where the fish were and they knew how to catch fish,* "pero el problema numero uno es para vender su producto." *From here they launched into a protracted and reoccurring discussion of the market, which is plagued by two main problems: imports, and the problem of sport & part-time fishers dumping their fish on the market to cover their trip expenses. The number one species here is* sierra *(kingfish), and they sell imported* sierra *in the supermarkets for 79 cents per pound, while they charge $2.00 for the fresh stuff. [Interestingly, when I checked the landings data, sierra wasn't the most frequently landed species, which must mean it's important in another sense]. This fish is central to Puerto Rican diets: it is the one you find at almost all kiosks. They propose that the big supermarkets not be allowed to sell sierra during the big catching months of April to August.*
- *Department of Agriculture programs, etc. should apply to them as well as to the farmers. It's easy for a farmer to reckon the value of his holdings in land and number of, say, planted plantain trees; not so for a fisherman.*

These were the reoccurring themes of the interviews. They also discussed, of course, the dynamics of their work and other problems. They are mainly trap fishermen, but they have been experiencing problems with boats cutting their buoys and have to assess the risk and problems associated with different trap setting protocols:

Figure SE.31. Five Fish Traps Tied Together Marked by Two Buoys



This was the one he drew for us, which is a number of traps strung together and bound with two buoys. If a boat cuts one buoy, at least they have the other, but this still makes checking the traps more labor intensive. It's best to have one buoy per trap, but that means that you lose your trap when they are cut. They described the traffic from Palmas del Mar as going every which way when they leave the marina. When they lose the pot, they also lose the catch, which is almost as bad as the trap itself. The trap also becomes a ghost trap.

Figure SE.32. Fisherman's Locker at Yabucoa

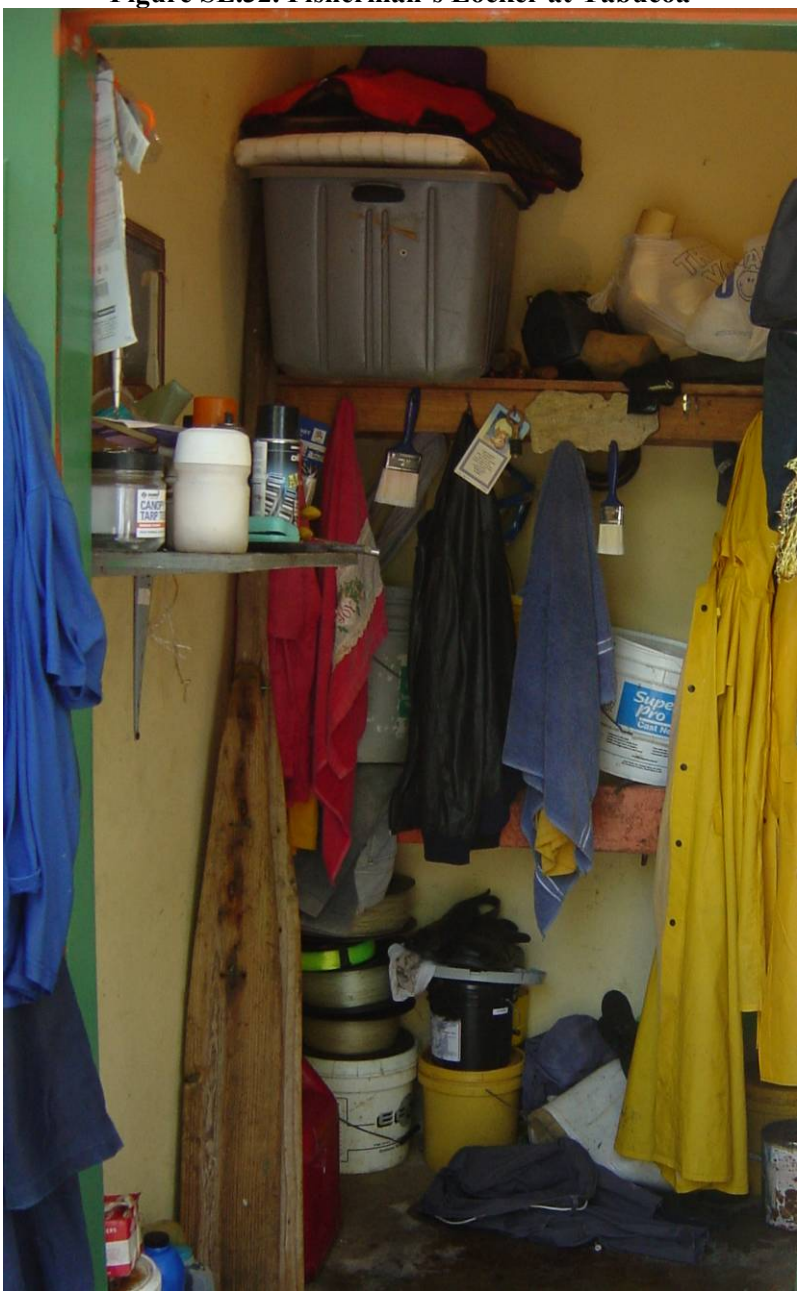


Figure SE.33. Plastic Trap at Yabucoa Association

In addition to traps, they use the cordel *(long line), which is necessary to catch what they consider their most important fish: sierra. Despite that they love sierra, they certainly have been experimenting with various trap designs. The above figure shows a plastic trap, but they spoke of traps of* madera *(wood) and have begun to experiment with crates for carrying chicks as traps (see photo). The president of the association from Palmas, wearing a yellow shirt embroidered with "Fishing Village, Palmas Del Mar," over the heart, was there as Yabucoa fishers explained the problems that trap fishers had. This Palmas president said earlier, "Soy buzo," (I'm a diver), and Yabucoa fishers began talking about the problems between divers and trap fishers, saying that it was one of their most pressing problems. He did qualify this with the statement that "not all" divers were thieves, but throughout this critique the diver remained very silent. Despite that he dives and these guys are trap fishers, they are obviously good friends.*

The diver's principal concern was not traps so much as the contradictions between NOAA regulations and Puerto Rican regulations, as well as licensing. They have to have special licenses, like duck stamps, for several species: sierra, langosta, carrucho, etc. Each of these costs around $10 - $15. A more pressing issue was the issuing of "beginners licenses" to experienced fishers, because their tax forms weren't available.

Figure SE.34. Traps at Yabucoa Association (the orange one is a prototype of a trap made from chicken cages)

Giving a highly experienced commercial fisher a beginner's license is insulting to them, but then they have to show their tax records for around five years before they work up to an intermediate and then advanced license.

*They said that Camuy fishers just received $1,000,000 for new facilities from the government, and that they developed a cheap ($300) winch (*malacate*) that they are using now. Dr. Martin, in Humacao, developed a crystal fish that attracted snapper like nothing else; for awhile he was able to corner the market, but now other fishers are using it. Hence, they are always innovating. As we were sitting around, the fishers began making rigs with hooks and lines. These weren't* palengres *(multi-hook long-lines), but single hooks dangling from single lines, for deep water fishing rather than trolling. Despite that they only mentioned traps, diving (Palmas fisher), and* la cordel *(trolling lines), obviously they fish for snapper and other demersal species with these lines" (Griffith's field notes, June, 2005).*

Figure SE.35. Fisher Locker, Showing Motors and Equipment, La Puntita, Yabucoa

Figure SE.36. Some of Today's Catch, La Puntita

Figure SE.37. Frozen Fish (mostly *sierra*), La Puntita

Yabucoa Census Data

Table SE.14. Fishing Locations and Styles, Yabucoa (n= 12)

Variable	Percent
Shore	25
Continental Shelf	83.3
Shelf Edge	16.7
Oceanic	66.7
Reef Fishes	91.7
SCUBA Diving	0
Skin Diving	16.7
Pelagic	75
Bait	83.3
Deep Water Snappers	66.7

Source: Puerto Rican Census of Fishers, 2002
Totals do not add up to 100% because fishers typically fish multiple locations

Table SE.15. Selected Yabucoa Fisher Characteristics

Variable	Response
Association Member	83.3
Hours used for Fishing	
< 20 hours	16.7
20 – 30 hours	50
31 – 39 hours	16.7
40 hours	16.7
> 40 hours	0
Mean hours	26.5
Standard Deviation	10.959
Minimum hours	6
Maximum hours	40

Source: Puerto Rican Census of Fishers, 2002

Table SE.16. Gear Used by Yabucoa Fishers

Variable	Percent
Beach Seine	8.3
Trammel Net	25
Long Line	8.3
Troll Line	66.7
Fish Trap	25
Gill Net	25
Cast Net	75
Hand Line	75
Rod and Reel	25
Lobster trap	0
Snapper Reel	16.7
Winch	8.3
Skin	0
Spear	0
Lace	8.3
SCUBA	0
Gaff	75
Basket	0

Table SE.17. Marketing Behaviors of Yabucoa Fishers

Marketing Behaviors	Percent Reporting
Fish dealer/ buyer	0
Private	8.3
Association	83.3
Street vending	8.3
Restaurant	0
None	16.7
Sell fish gutted	33.3
Keep fish on ice	75

Source: Puerto Rican Census of Fishers, 2002

Table SE.18. Opinions of Yabucoa Fishers

Opinion	Percent reporting
Status of Fishery Resources	
Better	0
The same	25
Worse	50
Reasons for problems in fisheries	
Pollution	33.3
Habitat Destruction	8.3
Overfishing	8.3
Laws, regulations, and licensing	0
Crowding	0
Seasonal factors	8.3

Summary

Several points emerge from these focus groups, with what was not listed as a concern as important as what was. For example, during all the time spent criticizing regulations, the only reference to MPAs was the assertion, couched in conspiracy theory, that NOAA wanted to make a sanctuary out of all Puerto Rican waters. Instead, the fishers of Yabucoa and Humacao listed licensing problems and the importance of fishers' knowledge of marine resources.

Maunabo

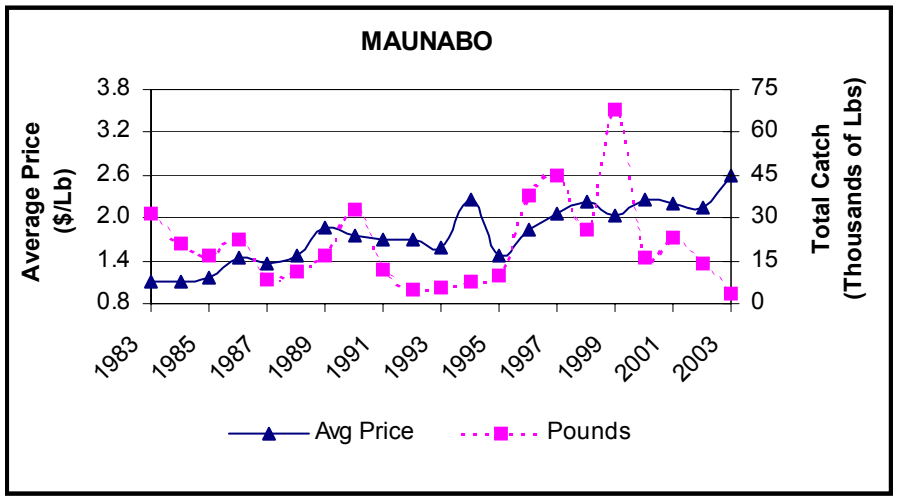
Maunabo is one of those municipalities where our ethnographic work yielded little information. Repeated visits to the fishing association at Punta Tuna, just outside the principal city, resulted in information from just one fisher, who was not that informative. Nevertheless, our visits did confirm that the association's site is both a recreational and commercial location, and that the association is involved in the seafood restaurant business in a limited capacity, indicating that they have the capability for a viable association even if the association is functioning in a reduced way at this time.

Table SE.19. Maunabo Census Data

MAUNABO	1950	1960	1970	1980	1990	2000
Population Characteristics						
Population [1]	11,758	10,785	10,792	11,813	12,347	12,741
Civilian Labor Force (CLF) [2]	2,703	2,072	2,111	2,345	3,204	3,286
CLF - Employed	2,671	2,004	1,983	1,662	2,336	2,427
CLF – Unemployed	32	68	128	683	868	859
Percent of unemployed persons	1.18	3.28	6.06	29.13	27.09	26.14
Industry of employed persons [3]						
Agriculture, forestry, fishing and mining [4]		1,200	576	140	166	88
Construction		100	173	186	140	303
Manufacturing		40	206	273	300	479
Retail trade		144	202	185	300	176
Socioeconomic Characteristics						
Mean travel time to work (minutes) [5]		N/A	N/A	21.8	24.6	34.4
Persons who work in area of residence [6]		1,808	1,438	905	1,468	965
Per capita Income (dollars) [7]			506	1,154	2,528	5,400
Median Household Income (dollars) [8]		486	1,286	3,171	6,731	11,638
Individuals below poverty level [9]			8,788	9,278	9,226	7,517
Percent of Individuals below poverty level			81.43	78.54	74.72	59.00

Any problems the association may be having are set against higher than common rates of poverty, nearly 60%, with more than one quarter of its workers unemployed. Its fisheries contribute to the economy, even if its landings ranked only 31st out of 41.

Figure SE.38. Maunabo Landings Data, 1983-2003



These statistics show a mixed performance among Maunabo fishers, with the 21st century declines reflecting what was reported to us to be a struggling association. The early to mid-1990s also appear to have been difficult years.

Maunabo History

Like Yabucoa, Maunabo was part of the dominion of the cacique Güaraca and also settled by the Spanish late in the 18th century. Its economic base, agricultural and heavily dependent on sugar cane and tobacco (again like Yabucoa), had a large sector oriented toward producing bananas and raising livestock for meat. Toro Sugrañes suggests that tourism has always been somewhat of a force in its economy, blessed with lovely beaches, good restaurants, and guesthouses. In 1893 the Spanish built a lighthouse there, which is currently closed, and two other sites—the sugar mill Batey Columbia, built in 1901, and the central city, typical of Puerto Rican towns of the 1930s—continue to be of importance to tourists today. Much of the city was rebuilt after the 1928 hurricane San Felipe.

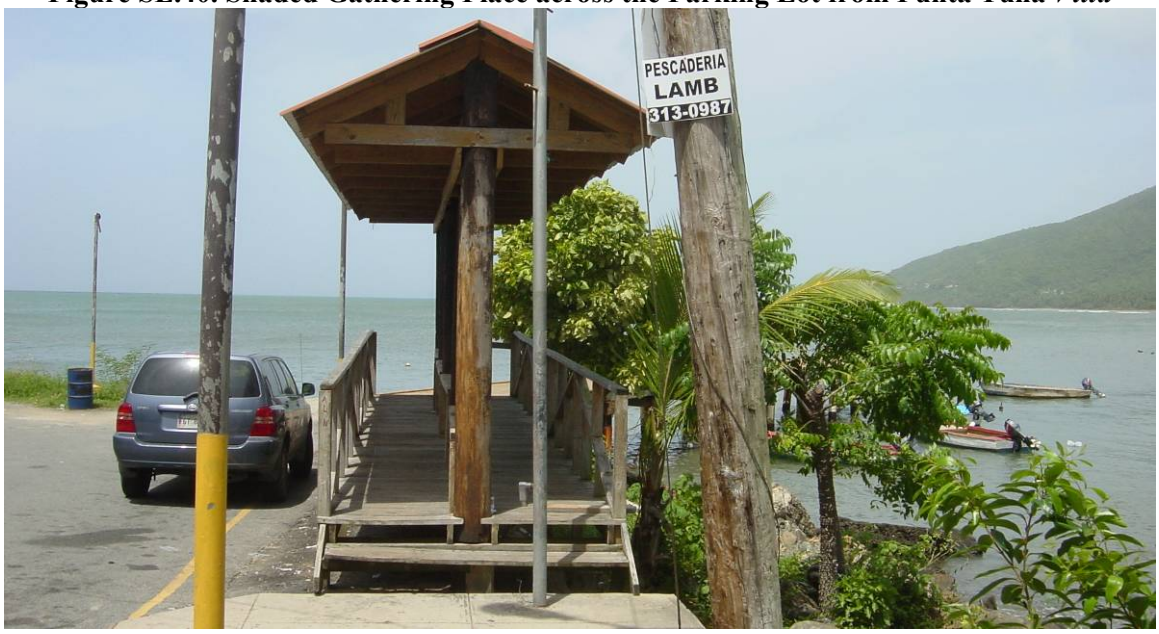
For many years, Maunabo's coast was blessed with a large land crab or *jueyes* population, which occupied the center of coastal dwellers' diets. While the consumption and sale of these fallen in recent years, it was important enough that residents of Maunabo's coast earned the designation, *jueyeros*—crabbers. This indicates a long and critical link to the sea.

Fishing in Maunabo

Maunabo's Punta Tuna is an association with 25 members, according to one fisherman who was talking to three other men on the porch of the house nearest the ramp. He was the only one of the four who said he was a fisherman, and from others knowledgeable about Maunabo's fishery we heard that the association was not functioning at its full capacity. In any case, its facilities include a restaurant that is open from Friday to Sunday only, and there are two other seafood restaurants (one open today, a Tuesday, and one not) neighboring the association's. Other seafood restaurants are along the main road (901) and near the association, down a small lane off of Route 760. Maunabo, like the others, has a diversity of restaurants, from the fancy to the open-air/ family run (medium) places to the pincho stands and other temporary units. In fact, the association seems to run a pincho stand itself, which sits between the facility building and the sea.

Figure SE.39. Ramp at Punta Tuna

Figure SE.40. Shaded Gathering Place across the Parking Lot from Punta Tuna *Villa*



From the gear in the vessels and scattered around, it looks as if filetes are a major gear, along with some traps. Recent landings data (2000-2003) confirm that gill nets are the most commonly used gear, accounting for about one-third of the landings, followed by fish pots (22.4%) and bottom lines (12.6%). With these gear and others they catch, most often, snappers, white grunts, lobster, parrotfish, and king mackerel. Other important gears are trammel nets, SCUBA gear, and beach seines. The day we visited, in fact, there was a *chinchorro* (beach seine) drying in the distance, near a few other yolas lining the shore beside the ramp. The muelle is also a recreational fishing site, which is common. A man and his son were there fishing. I asked if he was having any luck and he pointed to the pelicans and said, *"Ellos tienen mas suerte."* ("They are having more luck").

Figure SE.41. Association Facility & Restaurant, Punta Tuna, Maunabo

Figure SE.42. Chinchorro Drying Along the Shore near Punta Tuna Ramp

Figure SE.43. Yola with Gill Net just off the Punta Tuna Muelle

Figure SE.44. Recreational Fishers (father & son) Fishing from the Punta Tuna Muelle (note the pincho stand in the background)

Figure SE.45. Close-up of *Pincho* Stand